The area told as a story

An inquiry into the relationship between verbal and map-based expressions of geographical information

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Abstract

In the struggle every creator of expressions goes through, the restrictions of the media being used are there, to be obeyed or to be questioned. In this thesis I will show how maps and verbal texts are different media, and how these differences have consequences not only for *how* things are said, but also for *what* can be said at all using these two media.

A text contains too much and too little information to make a map. This means that there are things—for example, negation and disjunction—which can be expressed easily in texts, but which are difficult to put on maps. Further, a map needs a level of specificity in the input data in order to be created. Such specificity is rarely if ever found in texts. In the thesis, experiments are described in which this is studied in detail. Based on the results from these experiments, an inventory of types of information that are incompatible is presented, along with a discussion of the degree to which each of them is incompatible.

Even if the experimental results are based on just one specific text, it is also argued that they are examples of a much more general feature, applicable to most if not all texts. The latter claim is sustained through a study of the literature in the scholarly tradition of comparing different arts and different media. It turns out that the findings from the experiments are in line with traditional as well as recent views in this area. It is explained why this is so, and what consequences this may have for how maps and texts are treated, in academia as well as beyond.

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Preface

My personal biography is written in maps. I learned to navigate with maps at the same time as I learned to read, well before I started school. In an orienteering[1] family, telling stories in the evenings using maps was part of my childhood. History was great, especially because I had access to a historical atlas. And when I found Tolkien, was I not really reading him for the geography? I never became a geographer or mapmaker, though, even though I spent one summer as a teenager surveying a few square kilometres for a 1:15,000 orienteering map (Eide et al., 1986).

It was well known among people in orienteering that we were lost without maps. We could not navigate in a car or on foot without them. When I eventually started to learn to do so, learning to navigate without a map turned out to be much harder than learning to use one. But it was possible. It had to be. People had always done it.

Eventually, I became suspicious of maps. This was not a suspicion that maps may not be telling an objective truth; that was well known, not only by scholars but also by practising map creators—I had learned my lesson during orienteering as well as during surveying. It was rather a suspicion that maps as such were hiding something else.

We learned in university that any text should be handled with care. As a literature student in Oslo in the late 1980s, when feminist and deconstructionist studies were all around us, we knew the dangers of believing in texts—single texts as well as Text as a major part of patriarchic or imperialistic society. Much the same is well known and well documented about maps. They lie; or

[1] "A competitive sport in which runners have to find their way across rough country with the aid of a map and compass" (OED, 2012d).

at least, they are a medium for lies (Monmonier, 1996). But they were and still are the best way to represent space. Or are they really, always, for everybody?

Acknowledgements

This project began in June 2005, in Victoria, British Columbia, Canada. This occurred between sessions at the ACH/ALLC Conference, when someone asked me a question: had I been doing anything interesting lately? I replied by presenting a less than coherent pile of facts and ideas: Smail (1999) documenting the lack of maps in Medieval Notaricus Publicus protocols, the lack of map use among reindeer-herding Sami people in Northern Scandinavia, and my own growing distrust of maps. This was received with interest and patience by the person asking the question: Willard McCarty.

From 2005 to 2009 the loose ideas developed into a funded project, complete with a detailed project description. Willard supported me all the way, through many turns and twists; plans for a PhD in Oslo, then plans for part-time study at King's College London (KCL), then finally as a full-time KCL student funded by the Research Council of Norway. I started the project in April 2009, and this thesis is the main outcome of it. I will not detail the extraordinary level of support I have received from Willard. I will just note that even though I accept full responsibility for this work, for better and for worse, it is hard for me to see how I could have managed this task without his encouragement and criticism.

But no man is an island, and there are many other people at KCL who gave valuable input and support during the project, in scholarly matters as well as beyond: my secondary supervisor John Lavangino, who explained to me how an English Department works, John Bradley, Michele Pasin, Matteo Romenallo, Raffaele Viglianti, Andreia Carvalho, Gabriele Civiliene, and all the other students and staff at the Department for Digital Humanities (DDH) as well as beyond. This also includes the external representatives to the upgrade committee, Melissa Terras and Hugh Bowden, who offered useful comments and nice encouragement at a time when it was indeed needed. A very special thanks to colleagues and friends Elena Pierazzo and Peter Stokes, who fre-

quently opened their home to me, for meals, sleep, chatter, discussions of texts and politics, or nerdishly sitting behind a computer in the evenings.

I would also like to thank the organisers of various workshops and seminars who gave me the opportunity to come and talk about my work, receiving feedback which brought me forward, step by step: The INKE team, especially Ray Siemens, always a positive and supportive friend; the interdisciplinary *So What?* seminar at KCL, organised by Will Tattersdill; and Pelle Tejsner and colleagues welcoming me and giving valuable feedback at the University of Aberdeen. A special thanks to the Hestia group: Leif Isaksen, Elton Barker, Stefan Bouzarovski, and Chris Pelling, who invited me in to be part of their discussion, even though my object of study is far away from Herodot. Of special value was the opportunity I had to speak at the Comparative Literature Seminar at KCL. The convener, Michael Silk, helped me in deciding on a topic which turned out to be quite useful to work through, and the discussion following the presentation was very useful for me. Warm thanks also to people living in a colder climate: the Sámi University College (Sámi allaskuvla) in Guovdageaidnu, and especially Nils Johan Päiviö and Johanna Johansen Ijas, for welcoming me to one of their Tuesday seminars, and to all the participants of the seminar for offering valuable comments to my presentation. I would also like to thank all the participants of the Research Group for Lexicography at the University of Oslo (UiO), for inviting me twice to present the project, offering valuable feedback.

I was able to work with the CIDOC-CRM Special Interest Group and take part in a number of meetings. This opportunity served a dual purpose for me. Not only is the standard in itself important to my work, but the opportunity to take part in its further development was valuable as a practical exercise in ontological modelling. A special thanks is due to its chair, Martin Doerr, and to Stephen Stead and Mika Nyman, who gave me valuable input, as well as to the rest of the group.

A number of scholars and non-scholars with specific knowledge in relevant areas have given me input and answered questions. The EDD group at UiO, especially Christian-Emil Ore and Jon Holmen, have been with me all the way, discussing and commenting. Tom Schmidt went way out of his role as a pro-

fessor in onomastics at UIO and offered help not only in understanding place names but also in other areas, from Scandinavian history to the English language. I am also grateful to Lars Elleström, Liv Bodil Eide, Dino Buzzetti, Rawdna Carita Eira, Oddrun Grønvik, Jan Tore Lønning, Arianna Ciula, Allen Renear, Dikka Storm, Alfhild Birkeland, Barbara Tversky, Daniel Lende, David Dobbs, Hilde Myrset, and the late Jan Terje Bjørke. Numerous others answered questions and gave me small bits and pieces of their knowledge, helping me to navigate the various areas of study that were of importance to my project. I wish to thank especially all the employees in archives and libraries in Norway, Denmark, Sweden, Germany, and the UK who have patiently helped me understand my own questions, and then providing answers to them. A very special thanks to Jane McGary for her tireless work in helping me to improve the quality of my English writing.

I have had the good fortune to be able to present my research in several conferences and articles, and would like to thank everyone who made this possible, including anonymous reviewers who offered valuable input. Another piece of good fortune was the extensive support from the Research Council of Norway. It made this doable! Participation in conferences and seminars was also made possible by a number of smaller grants. A big thank you to everyone who made this possible!

Last but not least, I wish to thank the people who gave me the background on which my map and navigational skills are based: my parents and all the others from whom I learned orienteering and other ways to relate to the landscape. I also wish to thank especially the fine group of people with whom I spent two weeks in France during the final phase of writing the thesis. For you it was a holiday, but you coped very well with my working and talking about landscapes. Last, but not least: Oda, Jonas, and Heidi, without whom it all would have had less meaning. Not only did you keep up the spirit during stressful periods, you actually showed an interest in my monomaniac talk about navigation and wayfinding. Thanks for believing in me, and Heidi, thanks for helping me with the writing. I really needed it!

Chapter 1

Introduction

The primary objective of this thesis is to explore how people express themselves and communicate about geography. Why do some groups of people, especially in the modern Western world, use maps extensively, whereas other groups—for example, those who held the title Notaricus Publicus in the Middle Ages—did not use them? To investigate this question, I will examine the relationship between verbal and map-based geographical communication. My hypothesis is that types of geographical information exist that can be stored in and read from texts, but that are impossible to express as geographical maps without significant loss of meaning. By modelling the geographical information I read from my source text into conceptual structures, and by trying to express these conceptual structures as maps, I will test the hypothesis.

1.1 Why did they not use maps?

In modern European societies, the use of maps is seen as a natural way of communicating about geography. This appears to have been different in other historical periods. Although the history of maps may be longer than the history of writing (Harley and Woodward, 1987, 92), and using map-like topographical representations seems to be common in oral cultures, there are many historical examples of cultures not using maps in situations where we would normally do so today. One example is documents written by the Notaricus Publicus in medieval Marseilles, as documented by Smail (1999). The documents describe

transactions during which geographical information was important. Nevertheless, Smail comments,

> But never, in tens of thousands of pages of documentation, in countless acts providing addresses and boundaries, in immense rent registers that collectively list the locations of thousands of pieces of property, will you ever find an image even remotely like a map (Smail, 1999, 1).

Another example comes from the Sami tradition in Northern Scandinavia.[1] Traditionally, not only verbal descriptions but also musical elements were used to describe landscapes. A *joik*[2] representing a place would often have words describing the place, and it could also have musical elements "painting" the place in culturally defined forms (Tirén, 1942, 46). The idea of a drawn map was known among the Sami. One of the functions of the ritual drum was to be a map of geographical aspects on the face of the earth as well as the celestial and the spiritual worlds (Manker 1950, 57–60; Keski-Säntti et al. 2003). But as far as I have been able to find out, maps were not used for terrestrial navigation up to the time of our source text, Peter Schnitler's border examination protocols, written in the 1740s.

These examples of not using maps do not seem to suggest primarily, or even at all, a lack of cartographic tools or knowledge. There may be practical reasons for semi-nomadic people not to carry maps with them, but they did carry the ritual drum, so if navigation by maps had been sufficiently important for them, they could have carried a few maps made on animal skin or on bark. Another possible explanation was given to me by the Sami author Rawdna Carita Eira in a personal communication: the medium of a two-dimensional map is too simplified to be used to record geographical information. A joik, using place names, appellatives, and sound patterns, serves the purpose much better.

This may be so. Another possible explanation is that you do not need an external representation of what you know, especially when the landscape is there

[1] The Sami is a first nation inhabiting northern Norway, Sweden, Finland, and the northwestern parts of Russia. They were previously known as 'Lapps'.

[2] A joik is a traditional Sami form of song or chant. It can also be spelled 'yoik'.

for examination whenever you are in doubt. You need it for communication, though. In the Marseille example, the need for communicating spatial facts may have been there when matters were to be explained to a visitor unfamiliar with the city. In that case, if words were not sufficient, why not go for a walk and show the visitor how it really is?

As for the Sami, they were mostly living either as farmers, under conditions not very different from Norwegian and Swedish farmers, or as semi-nomadic reindeer herders. Teaching geography to young people would occur during their travels. These journeys would take place in a restricted area or along a restricted number of known routes. They had a number of place names to assist them, as well as appellative nouns and joiks. Mathisen argues that the level of descriptiveness in Sami place names was so high that "a route . . . could be visualised as a map in the imagination of the listener, using only the place names."[3]

Maybe they would, as part of the communicative situation, also make ephemeral maps, in the dust or in the snow. Make a few lines on the ground, tell the youngster that this is the mountain, this is the river, this is that small valley; now, go *this* way, turn *right*, and you will be there. Then the map would be a part of the situation, closely integrated with the oral instruction just as a gesture would be. We are then close to what Ingold (2000, 231–235) calls "mapping", as opposed to "map making".

We assume that the people in Marseille, as well as the Sami and other peoples, used texts, written or oral, for geographical purposes. These texts would be created in context and included place names. For the Sami, musical elements could have been used as well. The fully integrated shamanistic pattern is called "performance cartography" (Woodward and Lewis, 1998, 4–5). "[T]he drum itself, the drumming and the decoration of the drum skin together functioned as a map" (Keski-Säntti et al., 2003, 122).

There are, of course, different types of maps. The examples above showed how people did not use maps in certain historical situations, but the maps

[3]"En flyttevei . . . kunne bare med stedsnavnene bli visualisert som kart i lytterens forestilling" (Mathisen, 1997, 125). The translation is by me; so are all the translations in this thesis except when another source is given.

they chose not to use, consciously or not, were maps they were able to obtain or make; at least they would need to be able to imagine them. The maps they were able to imagine presumably did not include anything like today's topographical maps. So, one possibility is that they chose not to use the maps they could acquire or make, but would have used our maps if they had had access to them.

I am not able to tell what people 300 or 600 years ago would have done if they had had access to our maps. What I will do is to study textual expressions in order to find reasons to use texts rather than any kind of geographical map. I will examine sections from a specific text to find out if written words can communicate some types of geographical information that maps cannot convey. This examination forms a central part of this thesis.

1.2 Why use Schnitler to study geographical texts?

In an interview at the farm Solem in August 1742, Ole Nilsen said that "North of there, no peasant farms are found."[4] How can we put the knowledge expressed in this sentence on a map? First we need to know where to put the "there" referred to and how far north "north of there" implies. Given that we are able to decide on that, how do we express the fact that no farms are found? We could make the area north of "there" blank. But blankness on a map does not say "no farms", it rather says "nothing of interest"—after all, we know there are things everywhere—stones, trees, streams. And maybe a farm or two, even if the map is blank.

How can we better understand such problems? Any text containing descriptions of an existing or fictional geography could in principle be examined in search for geographical information that is impossible to express on maps. Such information is more likely to be found in some texts than in others, however.

In the 1740s, Major Peter Schnitler was appointed by the Danish govern-

[4] "Norden der fra, er ingen bonde gaard" (**S1**, 152). Throughout the thesis, I use the short form **S1** to refer to the first printed volume of the protocols. See the bibliography for details.

ment[5] to explore the border area between the middle and northern parts of Norway and Sweden.[6] Significant parts of the text in the manuscript that he handed over to the Danish government consist of transcripts of local court sessions carried out by Schnitler in order to gather information about the local population as well as their views of the border areas. The material includes information directly relevant to the border question, as well as general information about these areas. The text corresponds to similar material collected through work carried out in other parts of Europe at the time (Burke, 2000, 125–132).

There are two main arguments for the use of this text in my investigation. First, it is based on interrogations about geography with many individuals, of whom a majority presumably did not use maps very much, if at all. And second, the voices in the text represent persons coming from different ethnic and professional backgrounds—Sami reindeer herders, Norwegian farmers, and military officers—thus bringing a set of different perspectives into the geographical conversation. In addition, the text is available as a computer-readable TEI document,[7] making use of it simple on the technical level.

In order to give an idea of which types of differences between maps and texts I assume to exist, I will provide another introductory example, taken from Schnitler's protocols and from a map he made in the same period. In order to see how this fits together, I will first give a short description of Schnitler's method.

The text of Schnitler's protocols reflects a history of information aggregation. First, he would collect data. The court protocols were written, and older written evidence was included. Then, based on the court protocols together with other sources of information, including his own observations, Schnitler would write aggregations describing larger areas. Based on his sources, Schnitler also drew maps of large areas to indicate where the border should be located. The following types of material are included in Schnitler's protocols:

[5]Norway was part of Denmark at the time.

[6]At the time, Sweden included what is now Finland.

[7]The Text Encoding Initiative (TEI) has created a set of guidelines for how to best make digital editions of textual documents. These guidelines are widely used in the humanities. URL: http://www.tei-c.org/ (checked 2011-11-15).

- Travel narrative and descriptions of important events
- Witness statements, containing answers to questions clarifying:
  - personal information about the witness
  - landscapes known to the witness
  - land use
- Other written sources included as appendices
- Aggregations, combining witness statements and other sources into descriptions of larger areas

In addition to all this, Schnitler made maps. These have not been included in the printed editions, but that is due to technical and economical limitations connected to book production in the twentieth century and should not bear any consequences for our understanding of the eighteenth-century material.

It was in Schnitler's interest to remove any inconsistencies in the witnesses' statements when he created the aggregations. On the one hand, his project was based on information from the witnesses, transcribed so as to remain truthful to each person's understanding of the situation on the ground and the manner of his explanation. On the other hand, in Schnitler's aggregations only the hard facts obtained from the witnesses survived. This process was completed with the maps. It is claimed that the truth is supported by the map as a medium; Jacob and Dahl (2006) describes, from America in 1652, a priest making a map to support his narration: "the drawing of the map gives materiality and objectivity to space, endowing it with an additional degree of reality" (Jacob and Dahl, 2006, 32).[8] The map becomes a visual memory of the discourse, in which time is frozen; the narrative was situated in time, whereas the map is outside time (Jacob and Dahl, 2006, 326–327). This process could be difficult, however.

[8]One may question the use of the word "objectivity" to describe a seventeenth century situation. The oldest documented use in the OED is 1803 (OED, 2012c); the use of the adjective "objective" is older, but the meaning is different from today's. I will discuss this further in chapter 3, proposing the use of "truthful" instead with reference to Schnitler's work.

Figure 1.1: Fragment of Schnitler's map from 1744[9](Mordt, 2008, appendix) on which the locations of Amberfield and Baanesfield are marked by me with a blue rectangle. The reddish line crossing the two mountains is the border.

The example given in figure 1.1 shows exactly how it can be difficult. The border is indicated by the reddish line going north-south on the map fragment, crossing Amberfield and Baanesfield. In his aggregation, Schnitler discusses two different views held by groups of witnesses living in different parishes, in which either one or the other of the two mountains is seen as the border landmark. Schnitler says he is not in a position to choose between these two views, as he has not been able to gather the two groups of witnesses together to reconcile the matter. He argues that the most likely solution is Amber-mountain, with Baanes-mountain being a part of it, to make both groups of witnesses more or less right. Still, both mountains are included in his list of border mountains with an "or" between (**S1**, 174).

They are both included on the map as well, but the "or" has disappeared. The two mountains are situated close to each other on the map; the former is larger and transected by the border, and the other is smaller and touched at the edge by the border. Whether the differences between them in size and in location relative to the border on the map are due to Schnitler's view of the choice most likely to be correct is something I do not know. But it is

[9]National Archives of Norway, Map collection, GA 269, Peter Schnitler, kart over Nordland amt 1744.

worth noting that, while in his written aggregation the "or" concept was easily expressed, this concept was not something he could express with similar ease on the map. According to our best knowledge today, Baanesfield and Amberfield were either two names for the same mountain, or the mountain denoted by the former was a part of the one denoted by the latter.

How can we systematise problems such as the two examples above? Is the knowledge a map can convey different from the knowledge a text can convey? Are maps more truthful than texts? Are maps outside time? These are among the questions which will be discussed in this thesis.

1.3 Outline of the thesis

The thesis consists of three parts. Part I deals with Schnitler's protocols. The scholarly approach in this part is based on historical and anthropological methods, and the part first introduces some theoretical issues. The context for the source text is then discussed at two levels. The wide context of the political situation is presented first, followed by the narrow context of the persons behind the text. These persons include, in addition to the author, more than 100 witnesses interrogated in court hearings.

The special history of the largest minority group in the area, the Sami, is outlined, as they represent a significant part of the cultural environment in which Schnitler wrote his text, and many of the witnesses were Sami. This is important for understanding the different voices in the text and the ways they relate to geographical information. This part concludes with a detailed description of the text itself.

In part II of the thesis, the modelling experiments in which the hypothesis is tested are described. First I outline the experiment set-up—that is, the computer-based environment—and then I present a series of case studies in which parts of the source text are analysed, together with an overview of the results found. The experiments are used to investigate how situations such as the ones described above work in detail.

In order to understand the research question posed, I need to clarify what is meant by using maps, as compared to using texts. This is necessary to show

how the results from this single source-based study have consequences for other texts, and for human thinking and communication more generally. In order to go beyond what can be found in the records of Schnitler's and the witnesses' meetings and reflections, I must paint a larger canvas. My initial understanding was that problems such as the ones described above will be reflected in many, perhaps even most, texts, if one tries to lay them out as maps. That will be the topic of part III, where the results from part II are discussed.

First I clarify how the hypothesis is supported by the evidence, and show a typology of the problems found. Then I widen the scope by asking what the results can tell us about the expressiveness of texts and maps in general. The traditions of interart and intermedia studies are used to understand and interpret the results. The relationship between geographical texts and maps can be seen as a special case of the relationship between texts and images. Cartographical theory is also used in these discussions.

This part concludes with a discussion of the viability of the method used. The scope and results of this research are similar to those of many research projects in the humanities, but the method of minute reading of the source text is supported by the modelling experiment. What was gained by this? Did the choice of method give insights impossible or very unlikely to be found through traditional methods? Answering these questions will include some suggestions for further research.

Part I

Historical context

Chapter 2

Maps and landscapes

People move in space, and we live our lives in time. In the time-scale of a human life, our surroundings are changing at different speeds, from the unmoving rocks through the slow shift of the course of a river, the growth of a tree and the slow walk of an elephant, to the frenetic sniffing of a mouse. Moving through a landscape, finding one's way, can involve all these different rhythms of change, but when we tell others how to traverse the same ground, or record our experience with the intention of communicating the journey somehow, they figure in our account quite differently.

My main area of research is expressions of the traversed environment in documentary form, as texts and maps. But in order to understand the expressions, we also need to understand their themes—that is, how humans and other animals find their way and their subsistence in the environment. Writing and drawing about wayfinding should not be seen as isolated from finding the way; they are not the same, but they are still connected.

The relationships between maps and texts can be seen at an abstract and general level, as a comparison between media types. This will be done in part III of this thesis, based on the history of interart and intermedia studies, the comparative study of different art and media genres. But before that, evidence will be collected in a much more concrete and specific way. The experiments described in part II document in great detail the relationships between **S1** and possible map expressions of the landscape information we can read from the text.

The differences between a story and a painting may be clearer than the differences between a description of a landscape and a map of the same landscape. However, this thesis will establish how these two sets of differences are similar in important ways. Both images and words can be used to bring embodied thinking about wayfinding and the landscape into the world of communication, but once either words or images are chosen, certain parts of the reality becomes easier to convey and other parts more difficult. People will overcome such difficulties, for instance by combining different ways of expressing themselves, but the differences between what can be conveyed through words and what can be conveyed through images are still there.

In this first part of the thesis, the stage will be set through a study of maps and texts. Wayfinding will be compared to navigation in order to clarify the practices behind the documents. Navigation is assisted by a map and is done from location to location in space, whereas wayfinding is something we do without a map, when we find our way from place to place in a region.[1] In this chapter there are two foci: what a map is, on the one hand, and what it means to find the way, on the other. Both are outlined as they are seen from a Northern Scandinavian historical perspective. In chapters 3 and 4, the source text used in this research, **S1**, is outlined in the historical context of its creation. **S1** has a double relationship to the reality on which it was based, since one of the reasons for its creation was to change reality. It documents pre-existing ideas of a border between countries, but it was created to be used in the establishment of a new border.

In this thesis as a whole, the understanding of humans as it has developed through the millennia of thinking leading up to and including what we now call "the humanities" is the scholarly centre. There are, however, other perspectives on human thinking and communication. One is based on the study of humans as part of the larger group of animals inhabiting our world. I will draw into the study of how humans move in the world some recent research in the areas of psychology, anthropology, and neuroscience. This includes how movement is steered by the brain in interaction with the rest of the body and with the environment. This discussion will question fundamental concepts. Is it really the

[1] This opposition, taken from Ingold (2000), will be explained later in this chapter.

case that 'space' and 'time' define the living conditions of animals? Should one use expressions such as 'environment' and 'events' instead? Is there something in our minds that can be called a 'cognitive map'?

This is connected to how we relate to the world we live in. Do we have representations of the environment in our minds? We know things about the world, and somehow this knowledge is held by our brains. Is it structured in a way that makes 'representation' the correct term? I doubt it. But it is beyond the scope of this thesis to give a well-founded answer to the question. I will use the expression 'representation' to describe what is in the brain because it is common in the literature. Its use may be metaphorical, but it is so widespread that I will not avoid it.

I find it hard to make a clear distinction between me as a creature thinking about space, navigating through space and representing space, on the one hand, and me as a researcher, on the other. I will not pretend not to have knowledge from far back in my life, from long before I embarked on a scholarly career. We all have such knowledge, and it is usual to do research in areas we know about from outside academia. It would be ridiculous to ask a botanist to lay aside all childhood knowledge of nature. But it is important to be open about where ideas come from, as far as possible. It is about showing my evidence, or my lack of evidence. It is about truthfulness based on the scholarly criteria of my time.[2]

In many types of human endeavour, we strive towards truth. I believe it to be true that Schnitler mostly tried to find and express the truth about the border issues, and I am trying to say true things about his work as well as about the relationships between texts and maps. Truthfulness means different things to me from what it meant to Schnitler.[3] In connection with his biogra-

[2]This understanding is in line with the critique of the so-called orthodoxy of science in Ingold (2010). I see myself as an inevitable part of the setup of the experiments to be described in part II; they are performed according to a certain perspective. This does not mean that they are not rigorous, but it means that the researcher, as the wayfinder, is an active participant rather than an outside observer—being there is central.

[3]The relationship between truth and truthfulness is an important issue, but it will not be discussed in this thesis. I merely note that people strive towards truth, that they base themselves on different standards of truthfulness, and that the concept of 'truth' is disputed. For a thorough analysis, see Williams (2002).

phy, circumstantial evidence will be used to establish not only how truthful he was, but also what truthfulness meant to him, both as an individual and as a representative of his time and of his social role.

The quality of this work is based on my ability to understand and interpret my object of research. I study it to understand it better, and I express my understanding in the present text. The researcher cannot escape being an active participant. In studies of cultural expressions, the gaze not only has a target; it also has a source. Someone is watching. In this case, 'someone' is me. My writing is a local process, as all science is performed locally, even though the aim will always be also to escape the local (Schaffer, 2010, 277–278).

This physical locale happens to be a hotel room in San Francisco. The rewriting may happen in London, Oslo, or even at camp close to where Schnitler started his journey. I will walk his landscape. I have walked the landscape of the descendants of some of the Sami and Norwegian witnesses. I have walked there with some of them. But I can never walk in the shoes of Schnitler or the witnesses. Schnitler had to cope with significant cultural and linguistic barriers, and so did the witnesses. The distance is not only between now and then, between us and them. It is also between them, then. An effort was clearly made when Schnitler and some of the witnesses held their discussions through an interpreter; communication was also difficult, although to a lesser degree, when he talked with Norwegian farmers.

The importance of the dialogue is to be found at several different levels. Schnitler talked to the witnesses. At this level the form of much of **S1** is court transcripts, documenting a type of dialogue. At another level, the dialogue is a way to understand how we can work with historical source texts in general. Dialogues are important in order to understand what is going on between a person and the natural environment in which he finds himself. It is also necessary for understanding the relationship between me as an interpreter and the text I am interpreting. Bakhtin (1981a)[4] saw literary texts as dialogical, in a way that seems to fit the later concept of intertextuality.[5] Whatever the

[4]I read an English translation of this text, so the original Russian citations are not included. The original article was published in 1975, but written in 1934–1935.

[5]I will not discuss dialogism in written texts here. See Tønnesson (2004) for such a discussion in the light of Scandinavian history texts.

dialogical aspects of writing are in general, it is clearly the case that Schnitler was involved in dialogues when he wrote significant parts of the text of **S1**. A dialogue with a physical other helps in forming our thoughts; we often learn what we know by saying it out loud, much as we learn a landscape by walking it.

The potential for meaning in a dialogue is rich. It includes encyclopaedic knowledge, but not only that: the environment is also a provider, a participant (or perhaps a set of participants) in the dialogue. Linell uses Gibson's term 'affordance' for what the environment offers, for relations of possibility between animals and their environments.[6] "People configure meanings and understandings from arrays of affordances" (Linell, 2009, 332). Linell sees affordances as similar to meaning potentials, but he uses 'affordances' for potentialities in concrete utterances, and 'meaning potentials' for the semantic potentialities of linguistic resources. If a witness describing the landscape can see a mountain he mentions from where he is speaking, he can use gestures and words to include this mountain. It is then an affordance in the dialogue.

The landscape we find our ways through can thus be seen as a part of the dialogues, together with stories told and remembered and memories of past travels. This is in line with Gibson's concept of the 'region', later taken up by Ingold. Gibson does not define the concept, but it is clear that an important difference between 'region' and 'space' is that the latter is a geometrical object, an abstraction, whereas the former has a meaning to someone. A moving observer sees the world from no fixed point of observation and cannot, strictly speaking, notice the perspective of things. Through extended movement she can develop a perception of a part of the environment from everywhere at once (Gibson, 1986, 197). This "everywhere at once" is a region, according to Ingold (2000, 227). This will be revisited below, after a section on maps.

[6]Gibson coined the word 'affordance' based on the verb 'to afford', implying complementarity of the animal and the environment. Affordances are relative to an animal; what is a type of affordance to one animal is not the same type, or even not an affordance at all, to another (Gibson, 1986, 127–128). The surface of a lake affords support to a flea, but not in the same way to a dog. In fewer words: Affordances are value-rich ecological objects which can benefit or injury someone (Gibson, 1986, 140).

2.1 Places and maps

'Map', as the word is used in the hypothesis presented in chapter 1, is a type of information object. In this section, a definition of maps will be given, followed by a short introduction to the history of cartography. The latter will discuss maps as particular documents in line with other meaningful representations of space in human culture; thus, it provides another take on the issue from that given by a definition. A fundamental distinction throughout the thesis will be between the map as a document, on the one hand, and on the other, the functions of maps—that is, maps used in processes and events.

In actual language use, the possible senses of the word 'map' vary widely; it can denote various things, from documents through ideas to structures in the brain. The uses include a number of metaphorical senses, but whether a sense is metaphorical or not, or to what degree it is metaphorical, is not always clear.

In this project I had to clarify the meaning of the word 'map' to be used in the experimental as well as in the theoretical comparisons between texts and maps. The definition offered in this section is prescriptive rather than descriptive. Although it is connected to actual use of the word and is based on previous definitions, it is not intended to include all senses of the word that are actually used, not even all common senses. I also need a definition of 'map' in order to clarify the possible relationships the groups represented in my source material had to maps. It will become clear in this section that it is not beyond doubt whether these two uses of the word 'map' are best served by the same definition.

Before moving on to a definition, we will look briefly into the etymology for 'map' and the corresponding words in Norwegian, Swedish, Danish, and Sami, which are various forms of 'kart'. According to the OED (2012a), the etymology for the English word 'map' is Latin *mappa* (map) or *mappa mundi* (map of the world). In medieval times, what we now call a map was not referred to using one specific expression in Western Europe.[7] What is today seen as a map could be called *carta*, *figura*, *pictura*, or *mappa*. The phrase *mappa mundi* ('map of

[7]It may also be the case that no such expressions existed in other parts of the world. This is not something I have investigated in any breadth, but a few comments will be made with reference to the Aztec culture in chapter 9.

the world') is known from the eleventh century onwards, but in addition to what we would recognise as world maps it could also refer to regional maps, other map-like documents, and even verbal descriptions of the world not using images at all (Schneider, 2006, 26).

I have found no indication that any of the languages and cultures I have studied had any word with a similar meaning to the modern word 'map' as I define it below before 'map' or forms of 'kart' were introduced as loan words. It seems to be the case that such expressions came into use in Germanic languages in late medieval to early modern times, stabilising as 'map' in English and as various versions of 'kart' in German and Scandinavian languages.[8] It then came to Sami from Germanic languages.

The word for map in Sami (*kárta*) is a loan word from Swedish and Norwegian, as documented by Qvigstad (1893, 165). He does not state when it was introduced, which would be difficult to do with any level of confidence for a language that was mostly unwritten until recent times. Given the time of Qvigstad's work, it must have been no later than the late nineteenth century. In any case, the time at which a foreign word becomes naturalised can rarely be pinpointed.

The word for map in Norwegian ('kart'), Swedish ('karta') and Danish ('kort') are loan words with the same etymology, through German ('Karte'), French ('carte'), Latin ('charta'), to a Greek word ('χάρτης') of Egyptian origin (Falk and Torp 1960, vol. 1: 500; Svenska akademien 1898, vol. 13: c. K 622). I have not been able to find it documented in Scandinavia earlier than the seventeenth century; Svenska akademien (1898, vol. 13: c. K 625) has the earliest use in 1642. In German, the word has been used since the fifteenth century, according to Auberle and Klosa (2001, 393), whereas both Pfeifer and Braun (1989, vol. 2: 799) and Kluge and Seebold (2002, 473) date the loan from French to the fourteenth century, but in the sense of "playing card".

The use of loan words is an indication that the idea of the map as one specific class of things was seen as foreign to all the cultures represented by these languages.[9] To me it seems that the general population in modern and

[8]There is also a form of 'kart' in English: 'chart', used primarily for maps of coastal areas and offshore waters.

[9]This is in line with the view of the history of cartography in a recent book by Wood

postmodern times as well finds it hard to accept a use of the word 'map' that denotes only what cartographers would call maps. More will follow on this topic later.

Throughout this thesis, I will use the following definition of 'map':

> A map is a document on a flat, curved or $2\frac{1}{2}$ dimensional surface[10] showing the distribution of physical, geographical and other features, with each point in the representation corresponding to an actual geographical position according to a system. The map includes texts to disambiguate the whole map as well as parts of it. The features represented on the map have a certain permanence, and they are represented independent of any particular point of view.

The definition is based on definitions made by central authorities in cartography and lexicography such as Bagrow (1951, 13), ICA (2003), and OED (2012a, I. 1. a.). But the recent history of map definitions has added some complexity. Harley and Woodward (1987) argue that the traditional definitions, specifically Bagrow's, are no longer adequate, because in recent years a broader outlook has emerged. They see maps as "mediators between an inner mental world and an outer physical world" (Harley and Woodward, 1987, 1), and thus, maps represent one of the oldest forms of human communication, existing long before physical map documents. All in all, this leads to a view that most societies used maps. "Mapping—like painting—precedes both written language and systems involving number, ... there have been relatively few mapless societies" (Harley and Woodward, 1987, 1). This wide definition of maps is shared by Jacob and Dahl (2006, xiii) as well, and it is in line with the traditional use of 'mappa mundi' that we saw in the etymology above.

One of the arguments for expanding the definition was to avoid a Western bias (Woodward and Lewis, 1998, 7–9). Although I accept the problem, I do

et al. (2010, 22–23).

[10] "$2\frac{1}{2}$ dimensions" is a cartographic concept for a map in which the height is expressed as real height. The map can, e.g., be an object made of polystyrene. It is not fully 3 dimensional because there is only one Z value possible for each X, Y pair; caves cannot be visualised. Terrain contours visualised on computer screens are also called $2\frac{1}{2}$ dimensional even if they are expressed on a flat screen, as they visualise $2\frac{1}{2}$ dimensional data.

not agree that expanding the definition of 'map' solves it; such an expansion is neither necessary nor sufficient. In order to fight against Western bias one has to accept the cultural expressions related to understanding, navigating, and discussing the outer world as truly different in different cultures.

Of course, when one is writing a history of cartography, the expressions used will have to be translated into categories in the language used in the text. But I cannot see how using such a wide and unclear concept as 'map' as the cited authors define it is helpful. The claim made by using this common word is, quite simplified, that the systems used by modern orienteering runners, Sami reindeer herders in the eighteenth century and pre-Columbian Aztec administrations were fundamentally the same. This is in line with the claim for an existing general map schema across the world.[11] I think both claims are wrong.

I understand the intention of using the word 'map' in comparisons between different systems around the world. It is also clear that popular use of the word includes such extended meanings; few people would call 'cognitive map' an oxymoron. A descriptive definition must include such senses. But in my research I need a word denoting map documents. The word we have to denote such documents is actually 'map', so that is what I will use.[12]

What Keski-Säntti et al. stated was used as a map in reference to the Sami ritual drum, as we saw in section 1.1, is not a map according to this definition. The same goes for what Woodward and Lewis (1998, 4–5) call "performance cartography". They are, however, examples of what would today be called "geocommunication", which will be discussed in chapter 8 below.

A prototypical example of maps as they are defined here is the topographical map, a large-scale map with contour lines that represent elevation. An example of a type of graphical representation falling outside my definition is the so-called topological map, where scale is not represented and directions are altered to create a clear visual image. Topological maps are used to visualise networks rather than landscapes; when they do represent a landscape, they focus on networks connecting the places. Typical examples of topological maps are

[11]The claim is put forward by MacEachren (2004, 198–205).

[12]This is only a part of the reason I have for using this definition. Section 2.2 below is to a certain extent a continuation of the argument for it. The discussion will be taken up again in part III.

metro or train system maps. Because of their special connection to networks, they can also be used to express more or less the same information as a textual route description, as we will see in chapters 6 and 7.

It is important that maps have no single point from which the whole mapped landscape is seen; they have no single perspective. The landscape is seen from "everywhere and nowhere"—each point of the map is seen from the same angle, as opposed to pictures where the whole depicted area is seen from one single viewpoint. The "everywhere and nowhere" perspective is quite close to how topographical maps are actually made based on aerial photography. In such a map production process, each point on the map is seen from two different places above the surface, at slightly varying angles. These are the airplane's locations in the air when each of the photographs making up the stereoscopic image on which the map is based was taken. A globe is a good example of a map that could not have been made without this "everywhere and nowhere" perspective. If a planet is depicted using linear perspective, half of it will not be in the picture.

Another fundamental characteristic of maps is that they do not depict moving things such as individual persons and cars. "Pictures are artificial displays of information frozen in time" (Gibson, 1986, 71), and this includes maps. This is so obvious it is usually left unsaid,[13] except in discussions with children, and it can be used for cartographical jokes. An experienced creator of orienteering maps once made a map for a "fun run" where a tractor was included. Although it was a tractor that would obviously never move again on its own, and it may have been more permanent than some of the other mapped features, such as paths, it was still immediately recognised as a joke. A symbol in the map legend with the word "tractor" next to it was clearly an anomaly.

I will use the definition above throughout the thesis. In the cases where I refer to discussions which are based on other map definitions, I will make it

[13] A related point is sometime made, that the price of producing paper based maps push the features mapped towards the ones which will be stable for a long time in order to slow down the need for new editions (Goodchild, 2008, 180). This is partly solvable using dynamic mapping, but only partially: large scale maps of high quality are based on surveys, and surveys are expensive. So it may still be necessary to emphasise stable features. The concept of 'dynamic mapping' will be explained in footnote 19 on page 203.

clear which definition is being used. However, a definition is not enough to understand what maps are: we also need to look into how they have been used. Here I will outline some aspects of the history of cartography. I have a double purpose in doing this. First, I will say more about what kinds of documents maps are through clarifying their historical production and use; and second, I will provide background for the issue of human wayfinding to be presented in the next section.[14]

There is a long tradition in Western societies of studying the history of cartography, often in connection with map collections. Traditionally, maps have been seen as a product only of the advanced text-producing cultures of Europe and Asia. In Bagrow (1951), the chapter "Maps of primitive peoples" ("Die Naturvölker") is given only four pages out of the volume's total of 312 pages. Bagrow's approach makes sense when we consider his idea of maps, which is in line with mine, as well as the sources known at his time.

One of the main problems in tracing the history of cartography is the close relationship between maps and other graphical forms in many cultures. How can we define some of the graphical art as maps if there is no concept similar to the modern map in the culture, and no systematic differentiation between maps and other documents is expressed?

In cultures where a distinct cartographical art started to develop some 3,000 years ago this is simpler.[15] But in order to talk about traditional mapping in the Arctic, as in pre-European North America and other places, the definition of "map" is expanded, as we saw above. Harley and Woodward (1987) discuss differences between cultures in regard to the use of maps in prehistory, emphasising that the use or non-use of maps results from choices made by the people of the culture in question, and we can never fully follow the reasoning behind such choices. "Not all prehistoric and indigenous peoples choose to be interested in graphic forms of expression or communication" (Harley and

[14]Even if I disagree with the definition of 'map' used in Harley et al. (1987), I am impressed by the quality and breadth of the work, and the discussion to follow is deeply indebted to it. It is a pity that the volume covering European eighteenth century cartography was not published in time to be used in my thesis.

[15]Even for these specific cultures the claim of a pre-modern cartographical tradition is disputed. For an alternative version, see Wood et al. (2010, 20–27).

Woodward, 1987, 48).[16]

In order to avoid confusion, one must differentiate between the wayfinding skills of many indigenous peoples, which are well documented, and the practice of making maps; in Ingold's words: the difference between mapping and mapmaking, as will be seen below. Very different wayfinding means have been used by different peoples.[17]

We should not overemphasise navigation as the purpose of maps. Each society must be understood on its own terms, and other motives, such as ritual or cosmological, may be more important than practical navigational needs. It may be that, for early peoples, mapping of topographical information had less to do with navigation than with a need to lessen fear by representing the feared; that visual and intellectual mastery led to symbolic mastery (Jacob and Dahl, 2006, 132–133).

To the extent maps are used for navigation, the physical environment is important for the mapping stimulus. Harley and Woodward emphasise how the Marshal islanders and Inuit use maps for navigation,[18] as they travel through extensive areas of undifferentiated terrain, whether ocean or coastal tundra. For other peoples, this would be different. "Land-based tribes, at least those not living in the deserts, need no such artifices and have not normally produced them for their own use" (Harley and Woodward, 1987, 48). This fits well with the historical environment of the Sami as well as that of Norwegian and Swedish farmers. For the Sami, artefacts that may be called 'maps' in the context of cartographic historiography were not only (probably not at all) something they carried with them in order to find the way; they served entirely different purposes. This again begs the question why they should be included in our category 'map'.

We know that many first nations used things that we would today be inclined to call maps. The Sami made drums with cartographic aspects. Several

[16] In this context, they clearly use 'map' to refer to documents, not to mental representations.

[17] Also the language expressions used for landscapes and for finding the way through them are very diverse, as documented by Levinson (2003).

[18] It is not totally clear if they mean maps as physical artefacts and, if they do, how widely physical maps were actually used. For other views, see, e.g., Di Piazza and Pearthree (2007) on traditional Polynesian wayfinding and Collignon (2006) on Inuit.

extant Sami drums from early modern times can be seen as bearing map-like features; that is, they have landscape images referring to specific features in the real landscape. But as a tool for navigating the terrain of Northern Scandinavia they would be even less helpful than a mappa mundi would be for finding the way from London to Paris; they may give a few clues, but if you do not know the way, you had better ask someone or use other aids in addition to the "map".

I know of no extant navigational maps from before our period of interest, the 1740s, that were made by a Sami for use by Sami people. Hypothetically, they could have made map sketches in the snow, but we do not know. All in all, it is likely that their wayfinding was not map-based, and their geographical storytelling used map-like physical artefacts very little, if at all. They would communicate about space and wayfinding using words, including names, and maybe connected to tone patterns in joiks as well as to gestures, in addition to the geographical communication and teaching inherent in travelling together.

Maybe it is as simple as this: the Danish government made maps of their physical territory, while the Sami made maps of their spiritual territory. Even if individuals or a group know how to represent space in diagrammatic form, they may still not see the usefulness of such a technique for making navigational maps. They use it when they need it, and in our case that seems to be for religious purposes. If the need should arise for making navigational maps—for instance, for travel beyond their own territory or to communicate across cultures—they may very well have been able to do so. But seemingly this never happened.

The major difference between colonisers and colonised was probably not the ability to make maps, but the motivation to do so. It is not necessary to keep a physical copy of a map you can redraw from memory. But in order to store information from multiple situations and sources, in order to make translations from local, indigenous information to a universal world map, the medium of physical maps is very useful (Jacob and Dahl, 2006, 37–38). The ritual and political reasons behind Western mapping are also central; maps were not only about navigation for eighteenth-century political leaders in Europe either. Maybe they were not even primarily meant for navigation. Wood et al.

(2010, 30) claim that the main reason for the "map explosion" around the year 1500 CE is the need of early modern states for various types of control.

This view is supported by the role maps grew into in these societies. Maps are significant for modern Western thinking. Their role as visual memories of discourses makes their conclusions visible, and thus credible (Monmonier, 1996). A map makes reality objective, and thereby identical for everyone. By turning reality into an object, it shows ontological power (Jacob and Dahl, 2006, 30). Maps are part of power games; finding one's place on a map gives a right to occupy the lands. They can be used by the powerful to demonstrate and extend their power, but also by the marginalised to fight for their rights (Tobias, 2009).

According to Brodersen, our world view (*Raumerfassung*) as modern Western people is based on the "objective" atlases we used in school (Brodersen, 2003, 10). So it is difficult for us to know what kind of world view people living under other conditions may have had. Our knowledge is not just shaped by using maps; based on findings about neuroplasticity in recent neuroscience, could it be that the physical brain is affected by growing up in a map-based society?[19] This may also be a reason why maps work so well for us. Scaled maps are so common to us that we do not understand how people can do without them. But maps of this type are very abstract. People in other cultures may have very different ideas, not map based but still functional (Brodersen, 2003, 44).

2.2 Finding one's way

To move away from maps as documents: what lies behind the documents—that is, how do people find their way through actual landscapes? This has been the topic of much research, of which only a few examples will be given

[19]The traditional view of a brain structure relatively immutable after early childhood is gradually being countered by findings revealing many examples of brain plasticity well into adulthood. One study showing changes in the brain spurred by thorough training in navigation in adults is Woollett and Maguire (2011). This research is not yet conclusive, but we may speculate that the brain also changes when map based navigation replaces non-map based wayfinding.

here, taken from psychology, anthropology, and neuroscience. The aim of this short discussion is twofold. First, in order to understand better how people use intellectual tools (in this case, texts and maps), it is good to have some idea about our general behaviour in the landscapes we live in. Second, in order to establish a background for reconstructing the geographical thinking of the witnesses Schnitler met, including the tools they may have used, it is helpful to know something about wayfinding in general.

Even if many maps and most geographical texts are not primarily made for navigation, texts and maps describing landscapes are still linked to wayfinding in an indirect sense. The ability to find the way is an important part of the skills needed to make maps and texts about landscapes.

To bring this down on the ground: the witnesses gave their testimonies to Schnitler; the missionary translated them; and Schnitler understood in his limited way what they meant and wrote it down. The abilities of all parties to understand and communicate were connected to their abilities to find the way in a landscape. The relationship is complex, but it is there. And when I read the text today, my understanding is based on my own experience in finding the way—in general, in landscapes such as the ones described, as well as at some of the actual places they described. In the experiments described in part II I used a computer to try to remove as much as possible of my own experiences from being parts of my readings, but in normal human reading, we use them.

Understanding wayfinding is therefore necessary in order to understand the witnesses and how they ended up verbalising their knowledge in the ways they did. It is also necessary in order to understand not only the roles of the other people present in the court, but also what was actually taken down in the protocol, and how we can read it today. This section will lead to a theory of how people in the eighteenth century found their way, using semi-nomadic Sami people as an example. This is necessary background for interpreting what they said about the landscape. But the discussion of wayfinding goes beyond how the Sami may have done it to general human tools and techniques. The results will not be all-encompassing, but they are to varying degrees relevant for many people, including myself.

I will not make any claim for an accurate mimetic representation of what

we do when we think and move, neither in this section nor in the thesis as a whole. What I try to get at are the implications of ways of thinking about spatial narratives and maps on the one hand, and actual navigation practices on the other.

Most cognitive processes are not accessible to conscious inspection (Boyer, 2010, 376–377). What is under cognitive control is reflective information and beliefs, whereas intuition can be described as a highly specialised, domain-specific cognitive system which is out of sight of the conscious mind. Navigation is an old skill, evolutionarily speaking, and it is very likely that we share much of this system with other species, presumably in interaction with specific human abilities. Evolution nudges us towards behaviour that on average increases fitness. Evolved intuitive systems are not necessarily innate, but capacities are; they are learning systems in which contextually appropriate intuitions can be developed.

An undeliberated system for wayfinding[20] seems to be important. The explicit map-based navigation we use when travelling through unknown territory has a much more efficient counterpart which can be experienced as a subconscious wayfinding in which one "feels" where to go. A skilled traveller has access to the parallel processing capacity of the brain in addition to the linearity of language-based reasoning when she finds her way. Tuan (1975) reports, for example, that people drive long stretches of well-known roads without remembering large parts of the drive afterwards. We can observe the same when people talk intensely while walking: if they do not know the area well they may get lost, but in a known environment they usually find their way without conscious effort.

We have rich and only partly understood systems for thinking and communicating about and moving in our environments. These systems are connected to many different tools we have created in order to assist us, from place names, chants, songs and stories, to paper maps and digitally based geocommunication systems such as GPS. Calling whatever is in our brains "maps" is understandable in a popular setting, because it connects this complex and only partly

[20]This concept is taken from Tuan (1975); he, however, used "navigation" instead of "wayfinding".

understood system to something we know. But in a scholarly context, we should be careful to examine what is being implied by such a metaphorical use of the word 'map'.

At least since the mid-twentieth century, human brains have been thought to contain mental or cognitive maps. The concept of the cognitive map was introduced by Tolman (1948). He did not claim that these cognitive maps were similar to map documents in form, he only stated a functional similarity; still, the choice of the word led to a widespread view that in our heads we actually have something quite like a map, decontextualised and based on a bird's-eye view. Critics of the concept of cognitive maps (e.g., Tuan, 1975; Gibson, 1986; and Ingold, 2000), confirm that this is a general understanding.

Although the existence of the cognitive map is widely accepted, there is strong evidence against it. I will discuss the critique from two angles: first based on the views of the psychologist Gibson and the anthropologist Ingold, then based on some recently published neuroscience. While Gibson and Ingold are actually critical of the idea of a cognitive map, few neuroscientists problematise the use of the expression. In the latter case, the arguments I present are mostly based on my understanding of their scientific results.

Animals, including humans, are capable of wayfinding and place-learning.[21] Gibson's theory of reversible occlusion gives a good explanation of how this works. A 'vista' denotes what is seen from an extended region when the animal moves around, it is a semienclosure. The views are not from specific points, but, in principle, from all points as they are seen in the animal's continuous movement. Different vistas are serially connected. In the terrestrial environment each vista is unique: it is its own landmark, unlike the mazes so often used in experiments. When the vistas have been put in order by exploratory locomotion, the animal apprehends the structure of its habitat. The apprehension is not so much in the form of a bird's-eye view, it is rather like being

[21]Unless otherwise stated, the word 'animal' will include the human species. It should be clear by now that I do not subscribe to a strict opposition between nature and nurture, or indeed between biology and culture. My source material comes from an area where the echoes of race biology are still audible (Skorgen 2002; Schanche 2000). But letting that difficult history of research push us into sustaining a dated belief in a clear-cut boundary between biology and culture does not serve the purpose of understanding the lives of humans and other species of animals (Ingold, 2000, 1–2).

everywhere at once.

> The getting of a bird's-eye view is helpful in becoming oriented, and the explorer will look down from a high place if possible. Homing pigeons are better at orientation than we are. But orientation to goals behind the walls, beyond the trees, and over the hill is not just a looking-down-on, and it is certainly not the having of a map, not even a "cognitive" map supposed to exist in the mind instead of on paper. A map is a useful artifact when the hiker is lost, but it is a mistake to confuse the artifact with the psychological state the artifact promotes (Gibson, 1986, 199).

According to Blakemore, a map is a tool for unknown territories: "a map is a concise system of communication which aids someone who has insufficient knowledge of an area being traversed" (Blakemore, 1981, 6). Ingold (2000) asks what the difference is between a person familiar with an area using knowledge to find his way and a stranger with a map. Are they both map users, the former one using the cognitive map in his head? Ingold argues strongly against this view, stating that there is no such thing as a cognitive map. Places exist as nodes in a matrix of movement, a region,[22] consisting of stories of past and future journeys. Thus, the two persons finding their way, one with a map and the other familiar with the area, use quite different strategies. *Map navigation* is done from location to location in space, whereas *wayfinding* is done from place to place in a region.[23] We use complex procedures rather than complex structures to find our way; wayfinding is a skilled performance. Ingold stresses the non-indexical nature of maps:

> Ultimately, the justification for extending the map metaphor into the domain of cognition must lie in the assumption, more often than not unstated, that what the map affords is a representation of things in space that is independent of any particular point of view (Ingold, 2000, 224).

[22] This the same specific meaning of 'region' as was outlined above on page 28.

[23] 'Navigation' and 'wayfinding' are here used in the specific meanings assigned to them by Ingold (2000). The following paragraphs will make it clearer what they refer to.

The view we have of a landscape we find our way through is not the bird's-eye view. A map of a landscape, however good and detailed, is not anything like what we see while travelling through it. It takes a recalculation effort to understand what a mountain we know from the map will look like from below in the landscape. When we move through a path of observation, we sense the landscape as an object we are within. In this context, it makes sense that mountains seen from different sides sometimes have different names.[24]

According to Ingold's view, there is no decontextualised map in a person's head that she uses when she is finding her way. Our knowledge of the environment is instead formed and re-formed as we travel through it. The traveller is neither using a map nor making it, he is mapping, that is, wayfinding, for mapping is different from mapmaking: "All wayfinding, I argue, is mapping; all navigation map-using. Thus mapping is to map-using as wayfinding to navigation" (Ingold, 2000, 231). Animals live in a world of everywhere-as-region, that is, the world as it is experienced by a wayfinding traveller along the way of life. For humans alone among species, cartography may transform everywhere-as-region into everywhere-as-space—that is, the world imagined from points of view above and beyond, the world we navigate with maps.

The capacity for mapping is not a prerequisite for wayfinding, but a consequence of wayfinding in the environment. Retelling a journey may or may not include what we call a map, and if it is included, the map may be either used or created in the process. If a document is created, it is usually not the main purpose of the event; instead, it is created just to be used as a tool, once. Gestures are also commonly used, which means that such storytelling borders on performance cartography. In that sense it is not cartography; instead, it is more like what we today would call geocommunication.[25]

Retelling travel stories may also be used in map-making. An example is the technique of map biography (Tobias, 2009). The perspective is different from the one we saw above, as the map is now turned into the end product and becomes the main purpose of the event.

[24]In the Innunait place name system described by Collignon (2006, 166–169), such differences within the society are common. Places systematically have different names based on the relative location of the speaker using the name.

[25]More on geocommunication will follow in part III.

> It is at the point where maps cease to be generated as by-products of story-telling, and are created instead as end-products of projects of spatial representation, that I draw the line between mapping and mapmaking (Ingold, 2000, 234).

What is it to know where one is? It could be to locate oneself on a map. But in ordinary wayfinding, it is rather to situate one's position within one's movement matrix—that is, within a region. One can stop and relate where one is to where one has been and to where one might be (Gibson, 1986, 200). In the latter case, identification is not spatial as in the former, but instead based on stories and memories of journeys previously made. Knowing where you are in the wayfinding sense is deeper than in the navigational sense. Thus, navigation, which is map-based, differs fundamentally from wayfinding, which is based on past journeys or narratives of such journeys (Ingold, 2000, 238–240).

In my opinion, Gibson's and Ingold's claims that there are no cognitive maps in people's heads are well supported. But can the belief in cognitive maps be undermined by showing it is not true? Few people would argue that the thing we have in the head is a map in the meaning of a document. It is some sort of metaphor. Seen this way, the cognitive map should be judged on its strengths and weaknesses rather than on its truth value. The metaphor may be useful even if it is clear that what we have in our heads is very different from maps.

How good is the metaphor? Is the purpose our minds' place-handling system really the same as the purpose of a map? The differences between wayfinding and navigation indicate that they are not at all the same. A metaphor will always carry over from the direct to the metaphorical sense. 'Cognitive map' easily slips over from "fills a similar purpose to that of a map" to "is nothing more nor nothing less than a map". Because maps lack many possibilities that other cultural expressions have,[26] this may lead to under-communication of the qualities of cultural forms of expression that go beyond what maps in a stricter sense can express. If we accept that a ritual or a narrative is a map, there is a danger of going on to think it is just a map, a notion which is in line with a

[26]At lest this is what I show in this thesis for one type of cultural expressions, namely, texts.

problem in Jacob and Dahl (2006): they focus so strongly on the qualities of maps that we risk losing all the qualities of the textual or performative systems that go beyond what a modern map can be used for.

Thus my argument against the metaphor of the 'cognitive map'. In neuroscientific descriptions of the mammalian wayfinding system, which I will now briefly discuss, the metaphor likewise does not hold up, even though it is frequently used. Again, it does more harm than good.

The word 'map' is used in neuroscience to denote the whole or parts of the systems in the brain that take care of our wayfinding and spatial organisation. I will take as an example the research into systems for spatial information in the hippocampus of rats, where the word 'map' is commonly used. These systems are claimed to be similar to human systems.[27] The established model contains four cell types vital for orientation: place cells, grid cells, head-direction cells, and border cells (Moser et al. 2008; Solstad et al. 2008). Together they form a system for spatial orientation. The researchers use the word 'map' for the system, in scholarly as well as popular articles.[28]

It follows from the system of four cell types that the representation in the mind is not an image, but a structure from which an inner image is a possible reconstruction. Further, with the head-direction cells, on the one hand, and on the other, the fact that a place cell fires when the animal moves close to the place in the real world connected to that specific place cell, it is clear that the location of the animal in the world is a part of what is acted on in the brain.

So, given an analogous system in humans, what we have in our brains are not maps. They are neither pictorial nor decontextualised, but rather dynamic representations where our current location is expressed in a network of places. This is more in line with Gibson's and Ingold's views than it is with the idea of a conceptual map. It can easily be seen as a network of places in a region.

[27]For ethical reasons, many types of experiments are only done on other species than humans. The results from research into the human brain are consequently less clear. It is an open question how applicable the findings are to humans. One could assume similar systems are used by humans as by rats, as it is often the case that similar systems are used by different species; still, it is not uncommon that quite different systems are evolutionarily developed to solve similar problems.

[28]For examples in scholarly articles, see the two cited above. For more popular presentations using 'map', see for instance Knierim (2007).

Acquiring information and organising it into a stable representation also seems to work better when one moves around in an area than when one looks at it—at least if one is a rat (Rowland et al., 2011). That is, landscape learning is better when the animal navigates than when it observes, just as Gibson described.

Even if the word 'map' is still used by many scientists for systems in the brain, Nicolelis and Campbell present a rather different view in a podcast interview:

> I don't even use the word 'maps' anymore. 'Maps' gives us an impression of a static 2D or 3D; and that's the reason they were used, actually. When Penfield first described them in humans, and Sherrington, in animals, I think this was actually the intent: to show that there was a static, carved-in-stone representation of the world. But I think that, once this revolution comes–in neuroscience, I mean–the word 'maps' is going to disappear; because they carry too much baggage with them.
>
> I like to talk about dynamic representations, or dynamic models. That's what I think the brain is doing: the brain is creating; continuously creating and updating (Nicolelis and Campbell, 2011, 21).

I will summarise my arguments against the use of 'cognitive map' in two main points. First, it is too far from reality. I have shown that neither seen culturally nor biologically can whatever systems we have in our minds be called maps based on any meaningful definition of a map. The concept has been tried out in the form of an as-if proposition. Such propositions tend to be taken as statements of fact until they run aground on their own limitations. This seems to be what is happening with the cognitive map in neuroscience now. And second, the idea of mental maps mixes levels and makes the different categories hard to understand. A map is a tool produced by humans for use by humans. Maps are documents, and thus passive.[29] Our brains form parts of a system

[29]Even if digital maps may be non-static in the sense that they change, they have no will to change; they are rather changed based on somebody else's intentions. So even non-static maps are not active. A totally different thing is that we often say that "the map says" or

we use to find our way in our environment. The map can be used by our wayfinding systems, and some of the functions of a map can also be found in our wayfinding systems, but that does not make anything in the brain a map.

We should be conscious about the metaphors we use, for wayfinding systems as well as more generally. Rather than 'map', I would suggest the use of 'geocommunication system' or, simpler for many people today, 'GPS'. Tolman (1948, 189–192) used the metaphor 'cognitive map' to distance himself from explanations based on passive stimulus-response. In that perspective, the cognitive map is more active and points towards Gibson (1986) and Ingold (2000), but as there is no map reader in the mind, the word 'map' produces the wrong associations. We see an active brain-body-environment system for wayfinding, and we should discuss it using concepts signalling that. We do not know its inner workings in detail, but we know what it accomplishes.

I have not said the last word in this thesis about the word 'map'. It will continue to be a difficult concept throughout. But by clarifying the definition and also how the map relates to the various systems used by animals to find the way, I have established a starting point for further discussions.

One of the strengths of the model put forward by Ingold (2000) is that it explains in a reasonable way how people can learn geography. Although remembering stories and toponyms will be part of such a learning process, wayfinding in the environment is probably more important. For the Sami of the eighteenth century, language was not mainly a decontextualised system as in printed text, but rather a system for expressing knowledge about concrete, practical tasks—not lists of isolated names. The Sami met place names in a context of travel narratives and other stories, often told while travelling. Thus, Jacob and Dahl's claim that in societies with few maps, "the best way of learning geography is based on the memorization of a descriptive text or of lists of toponyms" (Jacob and Dahl, 2006, 345–346) cannot be right. The people who produced those lists in the first place were most likely to have done so while travelling, and only through later scholarly work the lists came out decontextualised. The alternative to maps was not fragmented textual

"the map shows". This is anthropomorphising, in line with what we do for other documents: "the book says".

descriptions, but rather wayfinding in the environment.

With the speed of travel of, say, a Sami group moving from their winter to their summer area, there would be time for many stories about the landscape they travelled through, to be remembered by a young person not as a decontextualised set of words but as a total experience of words, tone, landscape view, smell of melting snow and mud, sounds of cracking ice, sore feet and cold fingers.[30] Walking the same landscape 30 years later, the brain-body system of this now adult person would have many ways to trigger the memories of stories heard as a child, similar to Proust's famous madeleine (discussed in chapter 8). Who needs a map when even a young Sami has the experience of many journeys?[31]

In communicating spatial messages, speech and joiks were used. Gesture and dance—termed "performance cartography"—may have been important as well. Drawings and models may then have added other qualities, including some sort of stability, although this stability might only last for a short time; strokes in the sand have more permanence than speech, but they are not something you can bring with you. And even if speech in itself is ephemeral, a person available for answering oral questions may still represent a permanent source of information.

Even people travelling over larger areas, such as hunters, did not need maps. General landscape knowledge and many pieces of detailed knowledge, as well as the likelihood of meeting someone to ask, would provide good assistance in finding the way. Many of the Sami lived in open areas where landmarks are quite visible in good weather. And what does it mean to be lost? A Sami travelling in a known type of territory with his equipment did not necessarily need to find the way quickly. Such a traveller has what he needs to survive for an almost unlimited time, and eventually he will find someone to ask or a place he recognises.

[30]Turi et al. (1910) give detailed and lively descriptions of such situations.

[31]The quality of the walk as a memory system was established independently in antiquity, as we will see in chapter 8. We can only speculate as to whether knowledge of such systems learned through his scholastic university education helped Schnitler in understanding common people in Northern Norway.

2.3 The stage

In this chapter, a few building blocks for the thesis as a whole have been laid down. A scholarly starting point was established and some basic concepts were presented, before a number of fundamental questions about cartography were answered and 'map' was defined. Then we went on to discuss wayfinding in the environment and how it is different from map-based navigation, using insights from psychology, anthropology, and neuroscience. We now have a general foundation for the more specific chapters to come, in which the focus will be on Scandinavia in the eighteenth century.

Chapter 3

The historical context

In order for the outcome of any experiment to be interpreted in a meaningful way, the data used in the experiment must be understood. Just processing data as if we know fully what they mean is not enough, because "those things that are given" turn out to be anything but straightforward and obvious.[1] In this case, the data are a textual product of human creativity. It follows that the context in which the source text was produced must be understood, as far as any such understanding can be reached, in order to interpret the results of the study. The background and context for the text will be presented in this and the following chapter.

Where did the text come from? It was created on the initiative of the Danish government in the specific historical situation of border negotiations. It was written by Schnitler, a remarkable man who had to invent his own methods to fulfil his task, and who did so with great skill and creativity. His sources were people from different classes, including a significant number of Sami reindeer herders. Seen from the perspective of the upper classes, the Sami were probably the most exotic nation in Western Europe at the time. Schnitler filtered everything through his intellect, combining the knowledge of widely different people into the border protocols.

In this chapter, I will describe the historical situation in which the border protocols were created. I will give a short overview of the Scandinavian history of the Great Nordic War and developments up to the signing of the border

[1] This is connected to the difference between data and capta discussed by Drucker (2011).

treaty in 1751. This will explain why the Danish government ordered Schnitler to do his investigation in the first place. It also gives a first outline of the reasons why the work was organised the way it was, which is an issue we will return to with other perspectives later. The special history of the largest minority group in the area, the Sami, will then be presented, as they represent significant parts of the cultural milieu in which Schnitler wrote his text, and many witnesses were Sami. The history of the Sami nation will be important to understanding the different voices in the text.

Then I will establish a narrower context by reconstructing the biography of Peter Schnitler. As the author, he was the main character in the process of creating the text; thus, he is the single most important key to its understanding. Finally, I will give some background for reconstructing what the witnesses brought to the meetings, focusing on their spatial knowledge systems.

3.1 Border negotiations[2]

Peter Schnitler's name first occurs in the border protocols in a letter he wrote about the border problem, sent by the director of the copper works at Røros, Leonhard Borchrevink, in 1741. The question of borders was not just one of the sovereignty of the kings; it was also about practical matters on the ground. The copper works needed timber for production, but the supply would be threatened if important forests ended up as Swedish.

Nor was the border issue just a question of special interests; it was relevant for the population as a whole. If a stable border could prevent new wars between Denmark-Norway and Sweden-Finland, this in itself would lead to a better life for people in Scandinavia. Schnitler was connected to the copper works as a legal advisor, but his interest in the border issues goes far beyond that, as I will show in this chapter.

There were ideological as well as political reasons behind the organisation of the border work. The ideological climate was a pietistic state under some influence of the Enlightenment, whereas the political situation consisted of two states trying to establish peaceful coexistence even though both were ready for

[2]I use Nissen's introduction to **S1** (xiii–l) as my main source for this section.

war if they thought they would profit from it. I will outline both the ideological and the political issues in this section.

The seventeenth century had seen a number of wars between Denmark and Sweden, leading to a reduction in Danish territory, especially with the loss of Skåne, Blekinge and Båhuslen in 1658. The last major war between Denmark and Sweden was the Great Nordic War, from 1700 to 1721. Denmark was involved in the war for a few months in 1700, then had peace until the Eleven Years' War, starting in 1709. Initially the war took place in Germany, Denmark, and southern Sweden, but in the latter part of the war, Norway too became a battlefield, with Swedish invasions in southern Norway as well as in Trøndelag.

In the peace treaty of June 1720, it was agreed to initiate work on defining the borders, but nothing happened until 1738. From 1738 to 1741, the border was established from Kornsjø in the South up to Brekken east of Røros, at $62°40'$ north. The work was done based on surveys in the field and on witness statements taken up in situ.

All disputes between Kornsjø and Brekken were only about minor, often insignificant, areas. The border in this area was drawn between the properties of the citizens, based on documents or on actual possession. The few and small disputed areas were split down the middle (Fraenkl, 1997, 132). The work stopped at Brekken because one of the major problem areas, involving Idre and Särna, began there. Apart from prestige and a feeling of historical right, the major reason why this area was important to the Danish government was the interests of the copper works at Røros.

The director of the works, Leonhard Borchrevink, had strongly approached the border commission about the need to control the Femund forests to supply the works. This included forests that Sweden claimed. In August 1741, he sent the commission a letter written by Schnitler about the border issue. This is the first time Schnitler's name is mentioned in the protocol of the border sergeants.

In 1742, Schnitler was appointed to go before the border sergeants and collect evidence. An important difference between the border work south of Røros and that on the northern stretch is that in the latter, the border was situated further away from the rural districts, in mountainous areas used only for seasonal activities, such as hunting and fishing, by the farmers on either

side of the border. It was, however, also used by semi-nomadic Sami reindeer herders.

In order to understand the situation in these areas, the border officials needed assistance. In Sweden, they were given such assistance through the ordinary local courts. In Norway, Schnitler was given that responsibility (Fraenkl, 1997, 15). Schnitler travelled extensively from April 1742 to November 1745, and he continued working on the border issue for the rest of his life. The final negotiations started in Strömstad in 1749, and the border treaty was signed in 1751, defining a border of 1,619 kilometres, which has remained unchanged since then.

The border was established based on the terrain and on information from local people. It was drawn taking the complex topographical situation into consideration, not by relying on grid lines as in many later colonial divisions. According to Nissen (1952, 73), the treaty marks the end of a process of moving from a person-based tax system into a modern system of land-based taxation and stable borders. A system of land-based taxation was more difficult to establish in Northern Scandinavia than in most areas of Europe because of the semi-nomadic way of life of some of the Sami population. The division of Northern Scandinavia went through three distinct, although overlapping, stages:

1. Pretensions from the states towards taxation rights on the different groups of people.
2. Development of an administration, with clerical and secular jurisdiction over the population. Establishment of churches and monasteries, and mission.
3. Attempted conversion of tax rights and jurisdiction to supremacy over land areas.[3]

In the mid-eighteenth century, the third stage was finished for the border between Norway and Sweden. The principles behind the establishment of the border created a need for knowledge on the part of the states, which is an

[3]The stages are based on Hansen (2001, 31–32).

important reason why resources were spent on Schnitler's work. Based on the legal understanding of the two states, the views of the local population were of vital importance to find out where the border should be. Spending resources on interrogating them in order to gather as much information as possible, and maybe even to influence their views, was a good investment for the future, as it helped the government arrive at the best possible solution. The common people, many of them belonging to the Sami first nation, were seen as important sources of knowledge. Such views on common people have not been present at all times and places, and it highlights how the relationships between majority and minority, between high and low, were played out in the Danish state at the time.

Schnitler operated in an area where there was continuous pressure against the Sami. There were of course many difficulties for all people of low status, including Norwegian farmers. The tax burdens were heavy, not least because of the war and the resulting crises in state finances. But the Sami, being a minority with a different language, an unusual semi-nomadic way of life, and a different traditional religion still practiced by some, had specific problems. The numbers of settlers in many Sami areas were growing. The new farmers needed all the resources they could get their hands on, and in a marginal area such as Northern Scandinavia this was bound to reduce available resources for the Sami reindeer herders. Many herders, for their part, tried to expand in order to secure their economic interests. There were regular conflicts between reindeer herders and farmers in the area.[4]

Hansen's three stages are significant for the way the Sami and the Kven[5] were seen by the states at this specific point in history. As long as the third stage was not finished, it was politically important to include the Sami and Kven populations in the states. This was different in later times, as one concrete example shows: in the nineteenth century, the expression "strangers"

[4]In addition to the general lines of conflicts between the Sami, the Norwegian, and the Finnish speaking Kven populations, there were many specific local problems, sometimes also within one ethnic group. I will not go into details here; this is well documented in Sami history (see references below), as well as in several governmental Official Norwegian Reports, e.g., Falch (1994), Svensson (2001), and Gauslaa (2007).

[5]Kvens are an ethnic minority in Norway who are descended from Finnish immigrants.

(*fremmede*) came into use, referring to the Sami and the Kven. Seen from today's perspective, this is clearly ridiculous, but it was in line with a general racist and colonialist attitude at the time. However, it would have been difficult for a representative of the Danish state to take this view before 1751. If the Sami were strangers, a logical consequence would have been that their areas were Swedish or Russian. After 1751, and especially after Norway entered into a crown union with Sweden in 1814 and the border treaty with Russia was signed in 1826, the territory of the Norwegian state was undisputed. When the Sami and the Kven were called "strangers" in the late nineteenth century, it did not lead to Norway losing areas, but rather to the Sami and the Kven losing their territory.

This cannot be isolated from the history of ideas. In order to understand Schnitler's relatively positive attitude towards the Sami, compared to how an officer 150 years later might have behaved, one must understand the differences in mentality between the Enlightenment and later thought about racial biology, while at the same time seeing it in the light of how state politics worked differently on the ground. In the border process, it was important for Schnitler to define as many as possible of the Sami as Danish-Norwegian subjects (Hansen and Olsen, 2004, 269–273).

The solution to the border issue was not at all a bad deal for the Sami, given the circumstances. One of the results of the border process was the first appendix to the border treaty (UD, 1967, 13–17), a document which has later been called the Magna Charta of the Sami (Sami Instituhtta, 1989). This was both a consequence of the treaty's being written in the historical climate of the Enlightenment and of the political situation in which the states found themselves.

3.2 A short outline of Sami history

To give the background for understanding the interaction between the different voices in **S1**, the people behind them must be seen in their cultural context. Norway is a national state with a well-documented history. The Sami are a distinct people, but they have no state of their own. Unlike many other

first nations, they have no point in history where they went through a "first contact trauma"; rather, they developed alongside the other Nordic peoples, maintaining a close but unequal relationship with them. Their traditional legal culture was eventually suppressed by the European textual legal culture, but the oral testimony so carefully gathered by Schnitler gave them a voice, albeit filtered. They had no written culture, and so no history in the European sense; but they had a different sense of history that resided in storytelling, not in archival documents. Schnitler is an aid to understanding them; simultaneously, they are a key to understanding Schnitler's work.

So the Sami were and are a specific people, a nation on their own, in a neighbourhood with other peoples, including the peoples we now call Swedes, Norwegians, Finns, and Russians. To what degree Sami of today view themselves as primarily Sami or primarily belonging to the national state in which they are citizens varies, and I would guess there were different ways to be a Sami at the time of Schnitler as well. This is hard to know, however, because there are no historical sources in the traditional European sense that see these issues from the perspective of the Sami.

The many voices speaking in Schnitler's border protocols are voices of civil servants, clerics, and military officers, as well as Norwegian and Sami common people. My claim is that we cannot understand **S1** as a historical text without understanding the Sami as well as the Norwegians and the Danes. We need to have some understanding of Sami history. This has traditionally been undercommunicated because Scandinavian histories in general have been written from the perspectives of the majority populations. I will outline the history of the Sami people seen from the perspective of the early twenty-first century.[6] Sami history has been a disputed area of research, not to speak of the controversies on the issue outside of research institutions, as can be seen, for instance, in local newspapers in Northern Norway. The matter is highly politicised. Even the idea that the Sami are a people with a history has only recently been accepted, and not by everybody.

[6]A good coherent presentation of the Sami history in Norwegian is Hansen and Olsen (2004), which covers the period up to 1750. Recent texts where sections on the Sami history before 1750 can be found in English include Niemi (1997) and Solbakk and Biti (2006, 18–79).

Based on the definition in the ILO convention on Indigenous and Tribal Peoples (ILO, 1989), the Sami are an indigenous people.[7] For many indigenous peoples (e.g., in the Americas), the concept of first contact, and thus of a pre-contact period, is recognised and important. This is not so for the Sami. There is no pre-contact time, for as far back into prehistory as we are able to speculate, they have been living with neighbours whose descendants are the Norwegians, Swedes, and Finns.

According to Hansen and Olsen (2004, 41), the ethnic group that became the Sami was established in prehistoric times, but firm borders were never recognised between the ethnic groups. They continued to trade, intermarry, and have many kinds of relations. The relationships between the Sami people and the Norwegian, Swedish, and other populations in the area have never been on an equal footing, however. The Norwegian, Swedish, and Russian states developed into stable, institutionalised entities with strong central administrations based on writing and archives through the medieval and early modern eras. Although the Sami could sometimes choose with whom they wanted to trade, they never had any direct access to international markets and were always dependent on local traders.

Eriksen (2006, 56–59) describes a breakthrough of text-based legal cultures in Europe in the late medieval and early modern times. This posed a major problem for all indigenous peoples, not least for the Sami. The text-based culture of the majority suppressed their traditional legal culture. All legal written texts concerning the Sami were made by others, and the existence of a Sami legal culture has only slowly been acknowledged in the most recent decades. Historical texts concerning the Sami, including **S1**, must be read in this context.

Eriksen quotes Diamond's claim that in general, farmers and nomadic tribes have different concepts of law.[8] In the meeting between the two legal cultures,

[7]"Indigenous people" is used in this thesis in the same way as it is used in the convention, and with the same meaning as "first nation". "Native" is also used with a similar meaning, in expressions such as "Native American". Older expressions now seen as derogatory, such as "primitive people", are only used in citations.

[8]This is more complex in our case because the Sami included farmers as well as semi-nomadic reindeer herders. I will not go further into such details in this thesis.

the text-based have always won. But even if the text-based systems will always win ultimately—which is disputable, given recent developments in first nations' land rights—the oral systems can still have temporary victories. **S1** and the development up to the border treaty may not be an example of a victory; still, it gave a number of Sami a forum in which to express some of their views on land use.

Even if the general tendency of an asymmetrical relationship is clear, there are many examples of local relationships based on trade and other types of contact which were on a more or less equal footing (Hansen, 2001, 16). There are also some indications of the development of a Sami chieftain (in the sagas called "king") system in medieval times (Hansen and Olsen, 2004, 214–220), but this is disputed and evidence is hard to find; it is mostly based on small passages in the sagas, as well as on some peculiar multi-room archaeological sites in Finnmark.

Be that as it may, by the eighteenth century, the Sami were firmly integrated as tax-paying citizens of Denmark, Sweden, and Russia. They had no written culture. A handful of Sami people were educated and learned to write[9] during the seventeenth century and the first half of the eighteenth, working as missionaries in Norway and even as priests in Sweden, but that did not constitute a separate Sami written culture, and the Sami had no institutions keeping archives. They were still, by and large, a nation without a history.

History in the European sense of the word, that is. They had, of course, oral traditions, including epic songs telling stories of the past (Gaski, 1987). They were not a nation without a culture; such things do not exist. But their limited number, and the fact that much of their surplus production went to the external powers as taxes,[10] hindered the establishment of a nation in a political sense.

Sources for Sami prehistory and history are abundant, from archaeological and other material culture to oral traditions. While documentation of material and oral culture is helpful in the writing of history, however, written documents

[9]Reading abilities, on the other hand, were common at the time, as we will see in the outline of the school history below.

[10]Before 1751, many Sami families had to pay taxes to two or three states in parallel.

are still unsurpassed as source material. This poses a problem for Sami historiography, as all the older documents were made by non-Sami. This results in a situation not very different from what Dening describes from Polynesia:

> And, since the history of Polynesian cultures could only be written out of sources that were European, one would always have to know who the Europeans were before knowing the Polynesians (Dening, 1996, 59).

Knowledge of the people through whom our sources are filtered is a prerequisite for a historical understanding of the Sami. The problems this poses are clearly seen in attempts to reconstruct the Sami pre-Christian religion, which have to be based on documents written by inevitably prejudiced missionaries (Pollan, 1993, 37–39). Schnitler's border protocols constitute a multi-vocal text, as will be seen in detail below, and it is both a source of information about Sami history and itself influenced by Sami culture. Therefore, we need to understand Schnitler in order to realise how the Sami may have talked and thought, and we need to understand the Sami in order to find out why Schnitler behaved and wrote as he did. My goal in the following is to establish such a double understanding.

3.3 Peter Schnitler: the writer

Schnitler grew up in an environment shaped by the threat of Swedish invasion. Through his university education he became part of a small class of "movers and doers" who took advantage of changes in Danish society around 1700 to break away from family traditions, to travel, and to do new things. When he left university at the age of 21 to join the Danish army, he used hard work and a combination of skill and good luck in linking up with the right patrons, as well as the will and ability to take chances. He looked for opportunities where men like him had not traditionally been looking for them, and ended up as a Lieutenant Colonel recognised as the creator of a set of documents now considered to be part of world heritage.[11]

[11]The importance of Schnitler's protocols was confirmed in 2012 when the archive of which the Schnitler material forms a part was included in the Norwegian document heritage under

The path he followed was full of risks, but the risks must be seen in perspective. His family history showed him that a war is not something one can just stay away from. Because of the position he held in the army, he was comparably safe during the war; the major threat to his life was the plague, and staying in Copenhagen as a merchant would surely not have saved him from that.

In the following pages I will outline his route through life and show how it may throw light upon his role with the border commission, as well as on the documents he left behind when he died. I believe he may have been pointed in the direction he went by feelings for his fatherland and for his King. I will not, however, attempt to split his motivation by distinguishing between opportunism and patriotism. The division, I suspect, would be quite anachronistic even if I had access to sources that could be used to investigate it, which I do not. Being paid for one's services through positions offered by patrons was normal at the time, and not necessarily seen as contradictory to moral virtue and patriotism.

The unstable political and military situation, with the decline of the universities and the social changes afoot, provided men like Schnitler opportunities to act in new ways. They didn't become dons, they were propelled out into the world. The presentation on the pages to follow does go in some detail to explain what kind of man Schnitler was when he started writing the manuscript behind **S1**. This will give us an external counterweight to the evidence found within the protocols for how he decided to do his work. The text of the protocols was under Schnitler's control. In this biography, sources outside his control are used as far as possible.[12]

UNESCOs Memory of the World programme. The webpage for the Norwegian document heritage: http://www.norskkulturrad.no/memoryoftheworld/ (checked 2012-02-29).

[12]The oldest source to the biography of Schnitler is Thomle (1887). He claimed to partly base his work on oral family tradition stemming from Schnitler himself. In the introduction he explains that he reproduces of a small booklet probably written around 1770–1780 (Thomle, 1887, 169). This booklet has not been found. The other important biographer is Nissen through his article in the largest Norwegian biographical encyclopaedia (Bull et al., 1923, vol. XII: 490–498) and his introduction to the printed volume 1 of Schnitler's protocols (**S1**, xiii–l), as well as in papers in his private archive (The National Archives of Norway in Oslo, private archive PA-0888: Nissen, Kristian). For the early years of Schnitler's life, Nissen builds on Thomle, making the latter our most primary source. For the period where Thomle

3.3.1 Family background and education

Schnitler was born on January 17, 1690, as the second child of the merchant Lorentz S. Schnitler and Dorothea Hansdatter Nobel, and grew up in Copenhagen. His father was born in Stralsund in Pomerania and his mother in Copenhagen. Her parents moved from Blekinge when it was ceded to Sweden after being occupied in 1658; thus, she could well have seen her family as victims of Swedish aggression.

Great events took place in Copenhagen around the time Schnitler was ten years old: first the death of King Christian V in 1699 and the crowning of Frederic IV, then the short war of 1700. A new war with Sweden would presumably arouse many different feelings in the population of the capital, which had nearly been sacked by Swedish forces only forty years earlier.

Schnitler had private teachers until he went to the University of Rostock in 1708. His father was educated in the same city, and he may have had relatives there. Schnitler's studies took place at a time of decline for the university (Heidorn, 1969, 69–71), as it was for the German university system in general. According to McClelland (1980), this was a time of transition and crisis in universities all over Europe:

> German universities probably never came closer to extinction than at the beginning of the eighteenth century. Formal, empty, and frightened of new ideas, they provoked ridicule and anger even among their own dwindling band of graduates ... most of them had lost touch with the important religious, intellectual, and social forces of the German states of 1700 (McClelland, 1980, 26)

The number of students enrolled was decreasing, but this was only the quantitative sign of deeper qualitative problems. In most instruction, scholasticism was the method and orthodoxy the content. The forerunners of what came to be known as the Enlightenment met with great hostility; there was no expectation that the staff should develop new ideas, and mostly they did not. The

is the main source, I have used other evidence as far as possible. These other sources are not about Schnitler in person, as such documents have proven hard to find, and the archive studies I have made in this project have been limited for lack of time. I have rather used general knowledge about the institutions he was connected to and the roles he played.

universities fell between two stools, as research took place in the newly established academies of science, and the worldly education of the *Ritterakademien* (academies of the nobility) was more useful for young people than what the universities could offer.

From the mid-seventeenth century the university in Rostock declined from an important Northern European institution to a local university for Mecklenburg, described as a typical protestant family university (Asche, 2010, 65–70). In addition to the general decline of the universities, it had its own problems around 1710. The Great Nordic War had stopped trade from the first years of the eighteenth century onwards. In the years 1709–1719 it went quickly downhill. Schnitler must have encountered these problems, but as he left the university in 1711, he would have avoided the worst period.

The decline in the number of students was less for the law faculty, where Schnitler studied, than for other faculties, but it was also caught in a decline, having little influence outside Mecklenburg around 1700 (Asche, 2010, 101–102). Education there had traditionally been in Roman law, but this became less useful as the local rulers developed their own legal traditions. Student morale, discipline, and conduct were also notoriously low at the time. It is, however, interesting in reference to Schnitler to see what the most important group of students was:

> Universities were, to be sure, predominantly "bourgeois" in their clientele and staffs, but they drew heavily on a small segment of the bourgeoisie, one Mack Walker has recently called the subclass of "movers and doers," those who left the fixed place in life guaranteed and decreed by the German towns to join the comparatively "rootless" class of professionals, civil or ecclesiastical, who belonged to another world wherever they lived (McClelland, 1980, 32).

In Denmark, the state was bureaucratised following the establishment of absolutism in 1660, similar to the development in parts of the Holy Roman Empire. We can see Schnitler's career partly in connection with this. The military system had obviously been a major part of the state before 1660, but it changed significantly in the decades preceding Schnitler's enlistment. Of

special relevance to Schnitler is the new military law of 1683, where the role of judge advocate was formalised. This development opened positions for men like Schnitler.

What were his qualifications for "moving and doing"? According to Thomle (1887, 172), Schnitler studied law broadly, he practised fencing and other sports, and he read modern languages. Only one of Schnitler's teachers, Dr. Epinus, seems to have published anything, and what he published was well on the conservative side. He was the author of theological and philosophical books, in which he took active part in the theological discussion of his time, defending Protestantism against accusations of heresy and defending orthodoxy against pietism (Königl. Akademie der Wissenschaften, 1875, vol. 1: 128–129).

There is nothing in the documents from the university that points to Schnitler as anything but a typical student.[13] It was less typical, however, for a merchant's son to become an officer; like other groups, they tended to take up the occupation of their fathers, which was in general more economically rewarding as well (Schiøtz, 1936, vol. 1: 88). Schnitler took up a non-combatant position in the army. Why did he do that? He may have had several different reasons, including the new opportunities in the bureaucratised state, influence from the university and from fellow students, family reasons, and personal motivation. Professional interest in the job he got could also have been a reason. Legal work was central to Schnitler from his youth to his death. Much of his life it was part of his main line of work; when it was not, he took appointments as a legal advisor. I will later argue for his "scholarly mind" in connection with the border work.

But could there have been another specific reason for his choice? Thomle (1887, 172-173) is not clear as to when in 1711 Schnitler left Rostock. This may be of some importance, because forces from the Danish army were led by King Frederik IV himself through Mecklenburg in 1711 in order to attack the Swedes in Pomerania. According to Harbou et al. (1899, vol. 3: 265), the army reached Rostock on August 19, and the King rode into town saluted, probably not

[13] I investigated this by tracing him through the digital version of the printed student register (Hofmeister 1922, 71; Schäfer 1922, 190), comparing his records with those of comparable students.

sincerely, by the city's cannon. If he was still in Rostock, Schnitler's cheering may have been more sincere. The King stayed for five days, with the army in camp outside the city. During his stay, the King was greeted by two of Schnitler's teachers (Hofmeister, 1922, 83).

Could it be that the explanation for Schnitler's decision to leave the university and engage in the war is to be found in something that happened during those five days? Is it possible that he met the King? It is possible, but not likely. He would, however, have seen him, and he could have met with officers in his own future regiment, the Viborgske, as it took part in the occupation of Rostock (Harbou et al., 1899, vol. 3: 301, 320–321). However, his patron and later father-in-law, Lieutenant Colonel Meitzner, was presumably not there at the time, as he was not yet connected to the regiment.

As we saw above, Schnitler's mother came from a refugee family. Did Schnitler have any personal reasons for taking part in the war? These are just speculations, but based on the patron-client system of the time, meeting, or even just seeing, his ultimate patron could be emotionally important for a young man with ambitions: it could steer him towards a position, and it could give his life a purpose. Further, the occupation of Rostock could have been important in a more practical way as well. Many officers would be there, potentially recruiting students like Schnitler. I will return to the issue of patron-client relationships shortly, but first I will sketch his war experience.

3.3.2 The war[14]

When Schnitler left the university, whatever his reasons may have been, the Great Nordic War was in its last phase: the period from 1709 to 1720, which is called the 11 Years' War. He was appointed judge advocate and regimental quartermaster[15] in the Viborgske Regiment, of which Lieutenant Colonel

[14]The description of Schnitler's role in the war is based on Thomle (1887), as well as a tracing of his regiments' movements, using mainly Harbou et al. (1899) as my source. The legal protocols assumed to be written by Schnitler during the war have been searched for in the National Archives in Oslo and Copenhagen, respectively, as well as in the State Archives in Trondheim, but they are assumed to have been lost. More thorough archival studies have not been possible within the time scope of this project.

[15]"auditør og regimentskvartermester"

Meitzner took command in 1712.

If the university gave Schnitler knowledge, the war would have given him skills. He had his first opportunity to practice as a judge, in conditions which must have been difficult, to say the least. But he did not only gain new skills. Even if he never took part in the war as a regular soldier or officer, he was still close enough to it to have seen what it was like, and he was severely affected by illness.

His role during the war was not military in the strict sense; it is described as a civil-military position.[16] He was not an officer, he was not armed apart from the rapier any man of his social class would carry, and he did not wear a uniform. During battles, he would be behind the lines, taking care of the regiment's funds and supplies. His legal duties were to chair interrogations during a court martial and to act as an administrator, keeper of the minutes, and legal expert at trials. The regimental court martial was responsible for cases against private soldiers and non-commissioned officers. With a thorough legal education from Rostock he would be more than qualified for the job—even for a judge, a degree in law became a formal requirement only in 1737, and for regimental judge advocates, it became compulsory as late as 1804.

In the next few years Schnitler was connected to regiments that took active part in the war. First he went directly to the siege of Wismar, which was called off in January 1712. On the way to his quarters, Schnitler fell ill and stayed in bed in Altona for several months. He left for Oldersløe, and fell ill again.[17] In the summer of 1712, his regiment conducted several manoeuvres and actions before taking part in the battle of Gadebusch in December. Of the Viborgske Regiment, more than half the men were killed or taken prisoner. Lieutenant Colonel Meitzner led the regiment with distinction, but he was severely injured and taken prisoner (Ovenstad, 1948, vol. 2: 165). They were in garrison in 1713 and 1714 while the regiment was rebuilt with new recruits. From 1714–1715 they stayed in Viborg. Then they took part in the war in Germany until

[16]The following description is based on Johansen (1997), Olsen (1982), and a personal communication from the historian Ola Teige on November 25, 2009.

[17]Illness is always a problem in times of war and the Great Nordic War was no exception. From 1710 to 1713, Sweden and Denmark fell victim to the worst plague in modern times, leaving more than 100 000 dead from the plague alone.

May 1716, when the regiment was sent to Norway because of Carl XII's attack.

Most of the regiment was again destroyed in 1716–1717 in the battles around Fredrikstad. In April 1717 the regiment was dissolved, and Schnitler was transferred to the Riphusiske Regiment and left for Denmark again. In May, however, he was appointed judge advocate and regimental quartermaster of the 1^{st} Trondhiemske Regiment in central Norway by his former commander, now Colonel Meitzner. Schnitler arrived in Trondheim in August 1717, recruited by the man we must assume was his most important patron. He would live in that area for the rest of his life.

3.3.3 Trøndelag: from the end of the war to border work

In November 1718, the Swedish forces invading middle Norway were approaching Trondheim, but the city was never attacked. On December 30, 1718, Schnitler was appointed Captain and commander of the Størenske Company of the 3^{rd} Trondhiemske Regiment,[18] even though he had no real military education. This might have been because of the scarcity of officers caused by war and plague, but it could also be connected to the fact that, according to Schnitler's family, just before Colonel Meitzner died in November 1718, he had accepted Schnitler as his future son-in-law.

Because of the death of King Carl XII, the Swedish troops left Trøndelag in December. Schnitler fell ill again in January 1719. By May 23, 1719, he had recovered, and he married Sophia Christina Meitzner (1700–1747). They eventually had 16 children. In 1734, Schnitler was promoted to Major, remaining in the same command as before. While an officer, Schnitler also took commissions as a legal advisor. One of his clients was the copper works at Røros, among whose owners were Thomas Angell and Johan von Mangelsen. As we saw above, the first really difficult problem in the border negotiations was connected to the needs of the Røros copper works, and Schnitler was appointed his task in the border work when negotiations became stalled there.

Schnitler had been in communication with various people about the border issues since at least 1738, and he had strong opinions on how the work should

[18] All of Schnitler's appointments are confirmed by Ovenstad (1948, vol. 2: 372).

proceed. After discussions with border commissioner Rappe in Trondheim in 1740, he wrote further on the issue. The new commissioner, Colonel Rømeling, used Schnitler as a secretary when he stayed in Trondheim in February 1742. He suggested to the government in Copenhagen that Schnitler should engage in the border investigations by travelling before the border sergeants and obtaining statements from the witnesses with the assistance of the district stipendiary magistrates.[19]

The border commission received Schnitler's first letter in August 1741. Less than a year later, he was appointed as an agent of the border commission. He went on three major journeys in the following years, from April to June and from July to November 1742, and then the long final trip from May 1743 to November 1745. The border examination protocols are the main documentation of his work, although other material in the National Archives in Oslo, such as his maps, also throw light on it.

In 1749 Schnitler was promoted to Lieutenant Colonel as a reward for his work, and for the same reason he was appointed Regional Commissioner[20] of Finmarkens Amt, a position he declined for family reasons. He continued working on the border issues until the autumn of 1750. Schnitler died in January 1751, a few months before the border treaty between Denmark and Sweden was signed.

3.3.4 Theoretical education, practical work and knowledge

Nissen's description of Schnitler's background is quite hagiographical. His legal studies must have been "exceedingly thorough" and his knowledge of law was "beyond doubt solid."[21] This is speculative, as it is based on what Schnitler did in the 1740s in Norway and not on any evidence from his years as a student in Rostock.

Schnitler's qualities as a border officer cannot be doubted. Doing a good job as a middle-aged man does not, however, automatically prove one has been well

[19] "sorenskriverne"
[20] "amtmann"
[21] "overmåte grundig"; "utvilsomt solide juridiske kunnskaper" (**S1**, xx)

behaved all of one's life. Almost to the contrary; Schnitler's work demanded that he improvise, think "out of the box". Is that something a person who always followed the rules would be able to do? Nissen's rationale seems to be that Schnitler's qualities in the 1730s and 1740s throw light on his character all the way back to his schooldays.

Although we know so little about Schnitler's work, or lack of work, as a student, we must assume he learned something in Rostock. He later wrote in several languages, including French, which is an indication of university education, as is his knowledge of law. It is quite obvious that he knew how to listen, which was likely to have been a quality developed or at least improved during his work as a judge advocate.

The way he manoeuvred himself into the border work bears the sign of an opportunistic "mover and doer". However, it is hard to see it as mere opportunism. He set himself up to hard work, away from his family and from the comforts of the city. Was it worth it? I believe it was, because I think that for him, it was more than career and status. I think he also had the curiosity we would today see as the mark of a scholar. Trondheim was the seat of the first Norwegian learned academy, The Royal Norwegian Society of Sciences and Letters, established in 1760. I think Schnitler's work must be understood partly in the light of Enlightenment scholarship. More will follow on that shortly, but first a few words about his possible opportunism.

As we have seen, much of Schnitler's biography before the 1730s is unclear. In order to better understand how people could behave at the time, I will describe briefly the marriage of Johan von Mangelsen, who would later play an important role in the border work. He took part in the defence of Trøndelag in 1718 and was promoted to Captain in 1719. Then, in 1724, he became engaged to the 14-year-old Kathrine Bygball, from one of the richest families in Trondheim and heiress to large properties, including a share in the Røros copper works.

Because of her youth, von Mangelsen applied to the King for a special license to marry, but the Magistrate asked her relatives for their opinion, which turned out to be that this relationship was against their will. Von Mangelsen still got a dean to publish the first banns. When her relatives forbade the

marriage, the couple left town and made themselves inaccessible in the countryside. Eventually, this led to the marriage being accepted, but her relatives took a while to accept von Mangelsen, who was obviously using the marriage to gain a position in the local upper class; it made him one of the richest men in Trondheim. Still, after a few years, he was accepted by the family, their relations became quite friendly, and he had a large hand in administering his wife's property (Bull, 1992, 102–104). He became a Major General in 1749 and was the chief negotiator for Denmark in Strömstad in 1749–1751. Von Mangelsen's behaviour may have been at the limit of what one could get away with in his society, but it was not beyond it.

That society was based on patron-client relationships, and the use of family relations to get positions was not at all frowned upon (Teige, 2001). How did Schnitler become a regular military officer, and how did he later get his important position in the border work? Men of Schnitler's class used their patrons. They served, and got their payment in steps up the ladder of society. Did Schnitler serve well because he had a moral obligation to do so, or in order to get payment in position? We do not know. I do not think we need to know, either. Maybe he would not have known himself, or even understood the question.

We can speculate that he saw his King in 1711, and that the meeting made him decide to serve in the military during the war. If so, he could have taken the decision based on a wish to serve the King in person. This would be a concrete relationship between the humble client and the ultimate patron. Getting paid back for his services with appointments was an obvious part of such a relationship, and similar rewards were routinely given. If Colonel Meitzner pulled strings to secure his daughter's husband a position, it would also be a normal and accepted behaviour. Today, we see the relationship between a civil servant and the state on a more abstract level, based on ideals of equal rights and free competition. In the early eighteenth century, they did not.

3.3.5 Truthfulness

Schnitler showed a close and minute engagement with the details of his study which may be identified with a truthful sage, as the role is described by Daston and Galison (2007). But this is only a part of the role he must have played. We may see him as a researcher influenced by Enlightenment ideas of truthfulness, but we must also recognise him as a loyal client of his patrons. I will argue in the following that he had found himself a position where the two roles could be combined.

Schnitler wrote his border examination protocols in fulfilment of a task he was given in two letters. One was sent from King Christian VI on March 16, and the other from Colonel Rømeling on March 31, 1742.[22] The letter to Schnitler from the King stated that because the border was so far from where people lived, the Danes would follow Sweden's method in collecting evidence in the villages. As the district stipendiary magistrates may not have had enough time or knowledge to do so, Schnitler was ordered to take care of it; he was knowledgeable about the work of the border commission and could spend all his time on the task. The practicalities were also described in some detail, including the financial means Schnitler would have access to, the people who would be supporting him, and the procedure for calling witnesses to court.

Colonel Rømeling followed up in his letter to Schnitler by providing more detailed instructions for his work, as a list of nine items. They describe the geographical area he was supposed to cover, the need to start at once and work as quickly as possible, the persons to whom Schnitler should send his various reports, and the need for accuracy. This applied to disputed as well as undisputed areas; Schnitler should collect anything that could be of use. He should gather all details on border landmarks, on the areas around them, and on the farms owning land on both sides of the border. He should also gather knowledge that would ease the travel of the border commission, and use his best consideration to record anything else that could be useful to know.

In item 7, he was ordered to gather details on the value of the contested areas, including copies of old documents. Based on this information,

[22]The two letters are printed in **S1** (xxvi–xxx).

> truth and the correct nature of the matter can be seen without prejudice. This will make sure that one will not because of lack of knowledge claim more than one is entitled to, which would complicate the negotiations more than necessary. As His Majesty wants these disputes brought to a friendly resolution, such claims will do him no good in the long run.[23]

Schnitler was instructed to be truthful. Truthful to what? Two main principles lay behind the border work. According to the topographical principle, the border was based on how nature was arranged, whereas the other principle, that of possession, was based on human knowledge and documents alone. Schnitler did not primarily study the natural landscape directly: he studied what people could tell him about it. So his object of study was mainly culture, to a large extent as it was seen and expressed by people of the lower classes. This means that Schnitler's approach was to determine what others saw. These others did not use maps. The statements they gave were indeed filtered through him before they took the form of a written text. However, he was eager to filter the court transcripts much less than he filtered the knowledge presented in his own aggregations. Both these types of texts are available in **S1**, and parts from both are used in the experiments in part II. The issues of multi-vocality and of internal textual differences will be studied in detail in chapter 4 below.

Schnitler's task was to describe landscape. Places are inherent particulars, rather than representatives of types. But even if each place is a particular, Schnitler still had to cope with a number of individual records describing the places. In that perspective, a place is what a set of observations are connected through. As we saw in chapter 1, he collected his data by observation and by interrogation. His aim was to reach the common truth, a description of the border that was true to all witness statements, or rather to what all witnesses would have agreed upon if they had been able to discuss the matter. When he was not able to offer a coherent description, as we saw in the example in

[23] "paa det Sandhed og Sagens rette Beskaffenhed kand uden partialitet komme for Lyset, og man i sin tid af Mangel for Underretning ikke skal paastaae mere, end man er berettiget til, hvorved Sagen i sin tid bliver vanskeligere, end som fornødiges, og H:s Maj:t, som vil have disse Tvistigheder bragt til en venlig Composition og Endskab, i Lengden ikke er tient" (**S1**, xxix).

section 1.2, this was seen as a failure on his side, not as an indication of a fundamentally incoherent reality.

He did not see the fact that different people gave different descriptions of the landscape as something worthy to be recorded; he did what he could to remove the differences in order to reach the essential truth. So there is indeed a tension, or a struggle, documented in the text, between individual internalised accounts on the one hand and, on the other, an urge to understand how the physical and legal landscape really was, played out in the difference between court transcript and aggregations. They play different roles in the text. Only when he was unable to come up with a coherent truth did Schnitler express differences between witness statements openly in his aggregations. He was much more likely to express such differences in the witness transcripts.

Schnitler seemingly did not try to conceal anything: he was open, both in including the statements from the witnesses and in the way he wrote his aggregations, as discussed further in chapter 4 below. But he had an ideal of a general truth that existed and could be read from the statements of the witnesses, in line with what could be seen in the landscape by himself, and found in the documents he included as appendices. A positivist scholar of the late nineteenth century might have seen the different statements made by the witnesses as important in themselves, as documents of what the people thought, and maybe even how they expressed it. I, as a twenty-first century scholar, have this interest. Schnitler seemingly did not.

When Schnitler developed his method, we must assume he based it on ideas that were available to him in his milieu, that he chose ways to solve the tasks that seemed natural to him. His method had certain similarities with truth-to-nature as the concept is used by Daston and Galison (2007). They show us how it is applied by natural historians such as Carl von Linné (the taxonomist Linnaeus). Linné's objects of study are different from the ones Schnitler studied, but the wish to differentiate the essential traits from the accidental ones is similar. In biological truth-to-nature, features common to an entire species were recorded, as well as those differentiating one species from others in the same genus. Anything peculiar to one individual object should be avoided. The aim was to document the archetype—the species. This archetype

was never seen, as it was not fully embodied in any specific specimen, but it was still assumed to be real. If we describe Schnitler's work in such terms, the statement of one witness would be similar to the individual specimen, whereas the correct border would be similar to the archetypical species.

At the time when truth-to-nature was the method of the scientist, the ideal persona was the sage. The ability to synthesise experience based on a well-stocked memory was central to the method (Daston and Galison, 2007, 44). This turned out to be a role Schnitler was able to fill. His practical work showed that he understood the importance of any person, regardless of status, as a source of knowledge. He was able to balance between the particularity of the interviews and the general truth he was uncovering.

I will now turn to what Schnitler was being truthful about in the transcripts of the interviews. As we saw above, this is different from his attempts at truthfulness in the aggregations, where he put forward the type—that is, a coherent idea based on the sources. The interview transcripts, in contrast, can in this context be seen as the individuals. The transcripts of the court sessions, with each specific witness statement, should be truthful to what the witness said. In order to evaluate his method to obtain that, and as background for understanding the difference between witness statements and other parts of the text, I will here present the witnesses.

3.4 Witnesses: the other voices

This presentation will be collective, as opposed to the way I have presented Schnitler. It will outline some general characteristics of Sami reindeer herders and farmers, as well as Norwegian farmers.[24] I will attempt to reconstruct the spatial thinking and communication systems of the common people acting as witnesses, with special attention to the question of map use. This understanding will be used to clarify how the different voices in the text play together. It will also be used in the interpretation of the results of my experiments.

I will include the biographies, as far as I can reconstruct them, for the

[24]The number of Kven witnesses is very low, so they will not be presented specially. Neither will any of the other infrequent groups, such as workers or officers.

witnesses whose statements were used specifically in the case studies when the studies are described in chapter 6. The presentation here will concern the witnesses from the lower classes in general.

3.4.1 Knowledge of maps among the witnesses

Schnitler's experience in the use of maps is evident from the fact that he spent most of his life in the army, the home of cartography. The ease with which he drew maps of good quality even though he was not a trained cartographer is clear proof of his thorough knowledge of maps. It is likely that his colleagues, such as his main interpreter to Sami, the former missionary Erik Helset, were also experienced map users.

So why are there no indications of map use as part of the communication with witnesses in court hearings? No requests to witnesses to draw maps can be found in the records of Schnitler's interrogations.[25] This is different from several contemporary reports from other areas. Reports from Siberia show how locals, such as Evenks, were asked to draw maps for visitors (Woodward and Lewis, 1998, 338–340). Similar situations are reported from North America; a significant number of the extant maps associated with native North Americans from before 1800 are based on maps drawn at the request of visiting Europeans or Euro-Americans.

Although the court sessions led by Schnitler did not include map creation, people of the educated classes still made maps for Schnitler. The hand-written protocols include as appendices several maps, such as vol. II leaf 190, which is a beautiful colour map made by the missionary Aaron Norman.[26] An important argument for the view that the lower-class witnesses were not used to

[25]Maps were not used much in any part of the legal system in Norway in the mid eighteenth century. Through the change from land hire to free peasants in the seventeenth century, the borders between parts of a traditional farm became property borders, with more and more buying and selling of land, leading to a large number of legal processes (Holmsen, 1966, 144–148). Even if there was a official call for maps in legal cases concerning ownership to land from 1719, this was very rarely done in local courts. Even in higher courts is was not fully implemented (Kiil, 1969, 84). This is in line with the lack of maps in medieval Marseille noted by Smail (1999, 1).

[26]National Archives of Norway in Oslo, EA-4062 Danske Kanselli, Grensearkivet, Serie F—Grensereguleringen, L0010, Vol. XXII. The maps were not reproduced in the printed versions of the protocols, presumably because of the costs involved.

maps is the fact that Schnitler did not ask them to make or use maps. After all, Schnitler met young people in his role as a military commander, and he knew quite a lot about the copper works in Røros from his work as a legal advisor. If map use had been common among Norwegian farmers or labourers, he would have known. The fact that he did not find it natural to use maps in communication with the people he met as witnesses indicates that such map use was not common among them.

It is also likely that Schnitler would have known if widespread map production and use did occur among the Sami. He had been living for more than 20 years in Trøndelag, frequently travelling in the countryside as an officer as well as on other duties. The Sami mission[27] was at its peak when Schnitler moved to Trondheim, and some of the missionaries were likely to have been active in the same circles in Trondheim as Schnitler when they were in town. The education of missionaries of both Norwegian and Sami background took place in Trondheim. Furthermore, as a border officer Schnitler worked closely with Erik Helset, a former missionary. A "relation concerning the lap finns" is included as an appendix to Schnitler's first protocol,[28] in which he demonstrates reasonable knowledge and understanding of the Sami, considering the time when it was written. He also gained further knowledge about the Sami through his subsequent travels. All in all, it would be strange if the Sami used maps without Schnitler's knowing about it.

It is arguable that the lack of extant maps does not prove they were not used; rather, it could be that they were not made to last, and some limited use could have been unknown to men like Schnitler. But much of the old Sami culture was seen as pagan, and certain material objects were confiscated by government authorities. If maps were in use, one would expect them to have been mentioned by missionaries, and they should have been among the confiscated artefacts.

As we saw in the etymology for the words for 'map' in section 2.1, the

[27]The mission was established 25 years before Schnitler made his investigations.

[28]"**Relation** om **Lap Finnerne!**" (**S1**, 56–64). "Lap finns" will in general denote what we today call Sami, but there may have been some differences in whom were actually counted as one. In general, care must be taken when translating categories from the eighteenth century to ethnic or professional groups of today.

loan word 'kárta' was introduced in the Sami language. This strengthens the impression that the idea of maps was seen as foreign to Sami culture. The same argument can be used for Norwegian farmers as well. If this is so, what kind of spatial understanding can we reconstruct among the Sami and the Norwegian farmers at Schnitler's time? For instance, what about the drum, which has so often been seen as a map? Noaides[29] used the drum to make decisions. "The drum would have been used by a shaman in a divination ceremony to indicate the general direction in which the hunters should go to look for game" (Keski-Säntti et al., 2003, 122). Should this use of a map-like object be seen as mainly spiritual or navigational? In order to answer such questions, we will examine local evidence in light of the general context of wayfinding and mapmaking established in chapter 2.

3.4.2 Labyrinths and drums

Eight extant labyrinths in Finnmark, also called "Troy castles", are among the rarest and most mysterious prehistoric sites in Northern Norway. The labyrinth symbol is well known from many cultures and times, in Scandinavia as well as around the world. All eight labyrinths are situated close to late pre-Christian Sami graves in the outer fjord areas of Finnmark. The labyrinths themselves are medieval or early modern (1300–1700 CE), so they may be from the same period as the graves.

The labyrinths are unicursal; once entered, one will be led to the centre, but the route is long and winding. Olsen (1991) connects the labyrinths to a rite of passage in which dead people move into the afterworld. These sites were established in the same period in which the possible "Sami kings" mentioned above may have been active. This was also a period of external pressure on the Sami. According to Olsen, rituals play an essential role in maintaining social cohesion during critical phases of a society. This may lead to the production of more visible and more numerous symbols during such periods.

If Olsen's interpretation is correct, the labyrinths could be seen as maps according to the wide definition, as they function as models of the universe,

[29] A noaide is a Sami shaman.

outlining the road the soul has to travel (Woodward and Lewis, 1998, 331–332). This use has some resemblance to the use of the ritual drum for "performance cartography" described above. In this interpretation, the labyrinths, as well as the drums, are used as navigational maps, but not for navigation of the terrestrial world. However, such labyrinths are different from map documents in a fundamental, physical way. The labyrinth is a thing through which one moves, like a landscape, whereas a map document is a symbolic representation of a landscape which itself is not a landscape one can move through. They are both symbolic objects, but in different ways.

The structure of a graphic labyrinth seen from above, literally or figuratively, is map-like. But this only brings us back to the difference noted in chapter 2, between the bird's-eye view on the one hand and moving through a landscape on the other. The whole point of the ritual labyrinth must have been that the participants did not have the bird's-eye view, that they were inside the labyrinth.[30]

The artefacts may have served to lessen fear by repeated representations of what is feared (Harley and Woodward, 1987, 53). Fear of the afterlife may have been intensified by the influence of early Christian missions; Norway, Sweden and Novgorod (later to be part of Russia) all became Christian during the Middle ages, and several missions were aimed at the Sami. What we see here is in line with our previous discussion. Objects that we may call "maps" today were used for what we today may call "navigation". Yet our thinking is anachronistic. There is no reason to believe that the Sami of that time saw it in the same way.

Hans Ragnar Mathisen is a Sami artist known by his pseudonym Keviselie. He started to make maps from a first nations perspective in the 1970s. Initially, this was based on the Sami areas, but eventually he made maps of other parts of the world as well (Mathisen, 1991). In his studies of the history of Sami spatial expressions, he mentions rock art, drums, and labyrinths. Furthermore, he sees a clear connection between the cosmology expressed on some Sami

[30]This is in line with Purves (2010, 146) comparing Herodotus' Histories to a gothic novel describing a house with secret rooms and passageways. Both the house and the narrative have secret rooms, so the architecture of the text as well as of the house as a whole is only known in the end. Secret rooms cannot be secret in the same way on a map.

drums and the layout of traditional Sami dwellings, which were either tents not very different from North American tipis, or turf huts. The layout of the dwellings was based on an "inner map"[31] remembered by the people, and physical implementations were remade each time a tent was raised or a new turf hut was built (Mathisen, 1997, 124–125, 129). This is what Rydving (2010, 117–118) describes as a movable sacred space. Thus, Mathisen sees this "inner map", the layout of the dwelling, and the drum, as three different maps of the spiritual world. We must remember that the Sami recognised no clear division between the physical and spiritual worlds, at least not along lines similar to those found in modern Western thought. In order to circle in on what this may mean, I will now use a genre of expressions combining these different layers: toponyms.

3.4.3 Place names and joiks

Reference to and evocation of places by toponyms and the Sami joik are parts of the traditional wayfinding discourse we need to consider. In the historical cultures within which Schnitler worked, place names had a varying mixture of denotational and connotational meanings.[32] The joik, a traditional Sami song which can be used to name a person or place, works in similar ways: one joiks a place, but one never joiks about it. Before we study how toponyms and joiks play out their roles in the Sami culture, a definition of 'place name' will be presented. I will use Olsen's definition, in which the social function of toponyms is expressed clearly:

> A place-name, then, is a word, or word-complex, that within one particular community — no matter whether great or small, but of a certain s t a b i l i t y — instantly evokes the idea of one particular

[31] His definition of 'map' is clearly in line with the extended one found in Harley et al. (1987), not with the definition I presented above.

[32] This thesis is not the place for a general discussion about the various types of meanings place names may have. It is still necessary to mention the claim that place names only denote, that they do not connote. One summary of such claims with several further references can be found in Nuessel (1992, 1–7). Similar topics have been subject to longwinded discussions in analytical philosophy, see, e.g., (Kripke, 1980, 26–31); a general overview is given in McCulloch (1989).

> place through an a s s o c i a t i o n b y c o n t i g u i t y. (Olsen, 1928, 5, highlighting in original)

This definition will be used throughout this thesis. It covers place name use in oral and written texts as well as on maps; we will see in chapter 8 below that symbols on maps both denote and connote meaning. The denotation is the reference to the mapped landscape, whereas the connotation represents other meanings read from the map symbols. Place names work in a similar way.

Words as they are spoken in oral communication are not distinct from their pronunciation and rhythm. Music is never far away from words. If words can ever be seen apart from music, a traditional Sami context is no place for such a division. In the following I will focus on one of the main functions of the Sami joiks: their use as names. Does it work in accordance with the place name definition above? A joik has both denotational and connotational force. It has meaning created by its linguistic and tonal forms, but it also refers to an external object. The object of reference is often a person but can also be, for example, an animal or a place.

> *The basic meaning and purpose of a joik is the fact that it is a referential unit of meaning.* ... The fact that a joik refers to an object I will call *the reference function.*[33]

One does not joik *about* a person, one joiks a person. The reference is important, but the person who created the joik is not. The text and melody of the joik may describe the reference object, whereas the joik taken as a whole refers to the object in the same way as the reference function of a name works.

In order to make this clearer, I will take as an example the joik of the mountain Kåldespakte/Gåbesbahte, reproduced here from Tirén's publication. In figure 3.1, the notes and the text of the joik, which describes a peculiar land form in words and tones, can be seen. The extended German translation of the text in English is approximately "I sacrifice (by smearing with grease) [to/on] the eagle, alá ..." The object of reference is a special cliff; in Tirén's words:

[33] "*Den grunnleggende meninga og bestemmelsen av en joik er at den er en referensiell meningsenhet.* ... Det at en joik henviser til et objekt, vil jeg kalle *referansefunksjonen*" (Graff, 2004, 147–148; italics in original).

> The cliff itself is visible from afar, like an aquiline nose suddenly rising from a plateau with relatively quiet lines ... This cliff ... is joiked with the following joik (No. 166). There are no examples of gliding up an octave and back to the tone with two quick glissandos, but rather heavily marked high-pitched tones expressing that the cliff is high.[34]

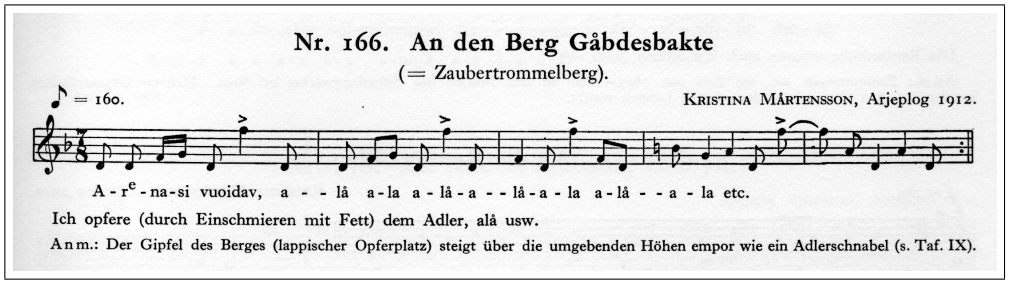


Figure 3.1: Example of a joik, from Tirén (1942, 123).

In Graff's system, the joik will, when chanted, evoke the cliff in the mind of an understanding listener. So will a few tones from the joik when they are hummed.[35] Further, the words and tones of the joik also describe the place. The knowledgeable listener will be reminded what the cliff looks like, and of the fact that it was a place of sacrifice. Further, a listener understanding the words and knowing the joik tradition, even if she has never before seen or heard of the cliff, will learn a number of things about it.

The relationship between the joik and the object is arbitrary, and the reference function is purely representative. In a local setting where the reference is known to everyone, joik can be used as a linguistic expression, as a symbolic representation of a person in a social communication setting. Not only is this in

[34]"Die Klippe selbst ist weithin sichtbar, wie eine plötzlich aufsteigende Adlernase auf einem Hochplateau mit verhältnismässig ruhigen Linien ... Diese Klippe ... wird mit folg. Vuolle (Nr. 166) besungen, in dem keine Schleudertöne, sondern stark markierte hohe Töne ausdrücken, das die Klippe hoch ist" Tirén (1942, 47). Thanks to Ola Graff and Raffaele Viglianti for helping me understand Tiréns concept of "Schleudertöne".

[35]As a joik is usually longer than a typical name, using it for naming is often impractical. In a closed cultural context, however, a joik can be referred to synecdochically by humming a few tones (Graff, 2004, 149–150).

line with other names, such as 'Bill' for 'William Peter Brown', but it is also in line with the definition of place names we saw above. By humming the tones, the speaker brings the joik into presence, together with the object—perhaps a person or a place—referred to by the joik.

But it must be stressed that not only the reference function is at play here. The joik is also made present with its words and the tonality, bringing into focus, for example, a story about something strange the referenced person once did or something that happened at the place—in the example above, the sacrifice. It is an absolute condition for calling joiks "place names" that we use a place name definition that does not exclude connotational meaning.

We can see a similarly complex play of denotational and connotational forces in Sami toponyms. Mathisen comments on "maps" used for travel, again using a wide definition of 'map', when he discusses landscape descriptions found in the appellative function of a place name. He gives an example of how he was able to locate a place based on his understanding of the meaning of the place name through a decomposition of its elements (Mathisen, 1997, 126–127). A similar use of the joik in figure 3.1 is conceivable. The rich semantic meanings of Sami toponyms are further documented by Helander in her discussion of loan names:

> In the original names the generic *skáidi* indicates the crucial semantic information about which kind of common features these localities have . . . In the original Sámi toponyms, the differences in the choice of the topographical appellatives reflect the differences in the topography (Helander, 2009, 496–497; italics in original).

Joik is not used for navigation today. It is possible that a joik could have been used when giving directions to travellers in earlier times; this would seem to have been an effective pedagogical tool.[36] For wayfinding in the physical world, this remains just speculation. Place names, in contrast, are clearly a part of wayfinding strategies today, as they were in the past. The function is based not only on denotation, but also on connotation.

[36]Personal communication from the Sami author Rawdna Carita Eira on April 19, 2010.

3.4.4 School history and reading skills

On the previous pages we have tried to understand some spatial representation systems used by the witnesses, and we have concluded that the witnesses from the lower classes did not use maps in the modern, navigational sense. Still, they were no strangers to symbolic representation. They did use place names and possibly also joik as parts of their wayfinding practices.

In this section we will see how they were also, to a large extent, reading people, although their reading skills did not function in quite the same ways as in later periods. What could the consequences of reading have been, for wayfinding as well as for their intellectual cultures more generally?

The common people acting as witnesses were in the midst of a change in their intellectual and spiritual lives when they were approached by Schnitler. Church education and private teaching had led to some reading skill among Norwegian peasants before the 1740s (Vannebo, 1984, 5). But in the first half of the eighteenth century, major changes were initiated in the way reading was taught in Scandinavia. Public education for all was replacing earlier systems based on the responsibility of individual families. The process continued for a long time after 1750, but systems introduced then represent a definite turning point in Denmark-Norway.

A formalised school system was established by law in 1739. However, the consequences of this specific reform could not have been seen much in witnesses only three to five years later, and further, the counties of Nordland and Finmarken, covering significant parts of the areas of Schnitler's examinations, were excepted. The reform of 1739 was based on local funding, and those communities were too poor. Even as late at 1775, a formalised school system was not yet established in these areas (Sogner, 1996, 228). But two remarks must qualify this. First, the reform shows that public education was on the political agenda of the time. And second, there was one important exception to this lack of public education, one that began decades earlier than the general formalised school system: the Sami mission.

In order to appraise the level of reading ability in Northern Norway, one has to consider the efforts targeted on the Sami population. Apart from the presumed problem of witchcraft, against which there were significantly more cases

in proportion to population in Finnmark than in the rest of Norway (Hansen and Olsen, 2004, 325), the region's widespread paganism seems to have been overlooked by the officials throughout most of the seventeenth century. King Frederik IV, crowned in 1699, represented a pietistic break with the orthodox tradition of the Danish state. In 1705 he established Christian missions in the Danish overseas colonies, and ten years later the Sami mission was initiated (Granås, 2002).

There was a long tradition of missionary work among the Sami population, but medieval and previous early modern attempts had been unsuccessful: even though many Sami people went to church, they still practiced the traditional Sami religion at the same time. A number of stories tell how the Sami served two masters, developing syncretic rituals meant to protect them against negative consequences from various Sami deities and powers, as well as from the Christian god (Hansen and Olsen, 2004, 323–324). The symbolic competence they maintained through religious practice must have been considerable in order to balance the two quite different religious systems.

The negative consequences for Sami society resulting from the religious conversions of the eighteenth century, including the physical destruction and confiscation of ritual objects, cannot be questioned. The Christian religion and church system of which people became part were not able to protect the society against the devastating consequences of alcoholism, which accelerated throughout the early nineteenth century,[37] similar to what occurred among Native Americans. This problem was partly solved only around 1850 with the introduction of so-called Læstadianism, a pietistic Christian movement accepting the superiority of the state churches, but with strong elements from traditional Sami religion in its practice (Zorgdrager, 1997, 170–181, 195–197).

On the other hand, the fact that the mission used Sami translations of Christian texts and taught a great number of Sami people to read must be counted on the positive side. The attitude on the part of the government is very different from the periods of strong Norwegianisation we find in later times, not

[37] I assume this development was not in general intended by the central administration in Copenhagen in the eighteenth century; however, some local officials may have seen a weakening of the Sami population as a good thing.

least in the late nineteenth and early twentieth centuries. However, the policy of using Danish in the education of the Sami always had its proponents. The first effective period of teaching ended around 1730, when a move was made from Sami to Danish as the language of instruction (Steen, 1954, 220–223). Nevertheless, the result of schooling in the 1710s and 1720s was that

> several of the Sami regions actually got an organised school system before the first Norwegian school regulations (around 1740) were established. In the eighteenth century, the visitation reports showed that the "Enlightenment" (especially the ability to read) in general was higher among the Sami than among the Norwegians in Finnmark.[38]

According to an investigation from the Eastern Finnmark missionary district made by Gerhard Sandberg in 1775, only 4–5% of the population did not know how to read (Steen, 1954, 295–296). Such a statement should not be taken at face value, since it is difficult after more than 200 years to know what the writer meant by reading ability, and it can be hard to detect if a person is actually reading a text or knows it by heart (Vannebo, 1984, 13). But even given the possible errors in such investigations, it is clear that a majority of the Sami people in Norway in the 1740s could read to some degree. Conditions seem also to have been good on the Swedish side of the border.

Many of the Sami, then, knew how to read, but very few knew how to write. This was quite common in this historical period. In today's educational programmes, reading and writing go hand in hand. That was not the case in Northern European countries when the use of texts was introduced to larger segments of the population. Reading religious as well as secular texts was important for people, but writing was less so (Vannebo, 1984, 5–7).

For the Sami population, this difference between the importance of reading and that of writing was even stronger, as writing to the authorities (e.g., to

[38]"flere av samedistriktene faktisk [fikk] et organisert skolestell før de første norske skoleforordninger (rundt 1740) ble iverksatt. På 1700-tallet viser da også visitasberetningene at 'opplysningen' (særlig leseferdighet) jevnt over sto høyere blant samene enn blant nordmennene i Finnmark" (Myklevoll, 1985, 46).

make complaints) was an important reason for learning to write among Norwegians. Few relevant authorities read Sami. The texts being published in Sami were also dominated by translations of Christian texts. The establishment of a native Sami writing culture was still more than a century in the future. The first printed book written by a Norwegian Sami was published as late as 1910 (Turi et al., 1910). The tradition of writing private letters in Sami is older than that, but I have found no indications that a culture of letters existed among the Sami as far back as the 1740s.

But what about the Norwegian farmers? The organised school system for Norwegian peasants was not yet established in the early 1740s. Still, reading was not at all unknown to the Norwegian population of the 1740s either. The reasons for this, however, were different from those among the Sami, potentially leading to a different social distribution of reading skills. While it is hard to find a clear connection between economic level and development of literacy among the Sami, the situation was different among the Norwegians.

Jostein Fet published two seminal books, *Lesande bønder* (*Reading peasants*) and *Skrivande bønder* (*Writing peasants*), in 1995 and 2003, respectively. His studies are based on the Northern part of Western Norway, which is quite some distance from our area of interest. His results, which are outlined in a common English summary for the two volumes (Fet, 2003, 387–391), are to a certain degree transferable to peasants in other parts of Norway, although we must remember that the economic level was lower in many parts of Northern Norway.

The main method he used is based on the study of information from inheritance settlements. These people were in general poor, so if books were found among their possessions, at least one member of the family would have known how to read; otherwise they would not have spent money on books. He also studied the "registers of souls"[39] made by priests in which they described the moral state and the intellectual accomplishments in their areas.

Fet documents how Norwegian peasant society was part of a larger literate culture. The language they read and wrote was Danish, which made communication with a common European culture feasible. Even if Danish was different

[39] "sjeleregistre"

from their spoken dialects, forming an obstacle against reading, the difference was not prohibitive; that is, the varieties were to a large extent mutually intelligible.

As we saw above, reading was much more widespread than writing. According to registers of souls, between 80% and 90% of the adult population were able to read in the 1730s. This is comparable to the proportion found in Sweden, but higher than in Denmark. These figures should be used with similar care, as noted above. However, even if the numbers are exaggerated and even if the proportion may have been significantly lower in Northern Norway, it shows that contrary to earlier belief, widespread reading did not begin with the public school system from 1739 on. The ability to write, however, was significantly lower according to Fet's findings, similar to what we saw above. As late as c. 1800, a figure of 12–24% is mentioned.

So, based on the evidence presented, did our witnesses live in an oral or a literate culture? The percentage of Sami people who were able to read was higher than the percentage of Norwegian farmers with the same skill. This difference may be even more significant owing to the fact that the farmers we meet in **S1** were mostly living in marginal areas, so they were less likely to read than the more prosperous farmer. Still, the practical consequences of being able to read were probably stronger for the Norwegians. As we saw above, Norwegians became part of a pan-European written culture when they learned to read. They could in theory read anything published in the Danish language. Although they mostly read religious texts, other types of publications were also available. If they knew how to write, they could, in principle, address most readers in Denmark-Norway in writing, including the king.[40]

A Sami who spoke and read only the Sami language would not be able to use texts in similar ways. Further, the number of available texts was much more limited, limited to Christian texts.[41] When the Sami of Kautokeino rose against Norwegian oppression in 1852, the violent movement was based on Læstadianistic Christianity. As the Sami language had no word or concept

[40]Parts of the administration in Copenhagen were Germans who did not use Danish, but all the kings spoke Danish.

[41]I went through the publications documented in Qvigstad and Wiklund (1899), and found no non-religious publications issued before 1742.

for war, they used the only source for such information they had: the Bible. Contemporaneous Norwegian movements were much more closely connected to political and religious movements in other parts of Europe.[42]

But even with the differences in levels of integration into a larger culture, reading ability may still be used as an argument for expecting some development away from an oral culture towards a written one, as described, e.g., by Ong (2002). However, we must remember how Scribner found that much of what was believed to result from learning to read was actually a consequence of attending school (Scribner, 1981, 127–128). Most of the Sami population did not go to schools in a modern sense; only a few who were trained to be teachers, priests or missionaries did so. So even with a significant part of the population being able to read, it may well be the case that most of Sami oral intellectual culture still existed in the mid-eighteenth century.

All in all, exposure to symbolic representation systems such as maps, texts, and religion varied between the Sami and Norwegian populations of the lower classes, but it is hard to find any clear patterns of fundamental difference. Members of both groups were exposed to religion. They all found their way through the landscape. A significant portion of the members of both groups knew how to read, but few knew how to write, and in general, they were not schooled. None of them used maps much, if at all.

The main difference was probably that the Norwegian-speaking population was culturally closer to the state, not least because of language, whereas the Sami population had to relate to two quite different cultural systems. The Sami would also in general be more skilled at surviving in the wilderness for extended periods of time, and they were probably, on average, better wayfinders.

3.4.5 Maps and texts: the use of symbolic representations

In order to conclude this section, I will put forward an argument based on the evidence we have considered so far. As we remember from chapter 2, a map is best defined as a kind of document that represents spatial relations of objects in the world; it is one of several tools or methods people can use to find their

[42] One example is the labour movement started by Marcus Thrane in the late 1840s.

way. The current popular use of 'map' to include all devices for or means of mental organisation of the world or anything else, as in 'cognitive map', dilutes the meaning of the term and so renders it useless.

Around 1740, the Sami traditional religion was under heavy pressure. It was partly abandoned, and partly driven underground. But the ritual elements of the religion, including drum use and the cosmographically based layout of their houses, were well known even among people who no longer took active part in traditional religious practice. The idea of some sort of map-like representation was present, possibly also among Norwegian farmers, and map-like sketches could have been made occasionally during conversations about the landscape. However, maps in the sense I define them were not used; neither were written textual route descriptions.

Other types of abstract symbolic representations were well known. Even if some people could not read, everyone knew someone who could. People were religious, and some even practiced two religions in parallel. As for orality, the Norwegians and Sami alike were partly reading peoples, but mostly not schooled.

The Sami used map-like objects when they needed them; for instance, noaides used them for ritual activities. Although they may have had a potential ability to make physical maps for navigation, they did not need those, and did not make them. Neither did the Norwegian farmers. They learned how to find their way without a map, by developing strong spatial awareness. They used written texts to read about religious matters, but texts do not seem to have influenced their practical lives much. It seems that symbolic representations impressed on physical objects, whether texts or map-like spatial figures, were used only for religious and spiritual matters.

Chapter 4

Schnitler's border protocols

The previous chapters started out with a rather broad scope before narrowing in on our object of study, Schnitler's border protocols, through an outline of its historical context. The protocols were created through a complex process, resulting in a text including travel narratives, court transcripts, written sources as appendices, and aggregations combining witness statements and other sources into descriptions of larger areas. This chapter represents a further narrowing of the scope, with a discussion of the text itself. This will lead us to the next part, in which the computer-assisted modelling of the text and its use in the experiments will be described.

Reading a text is a historically and culturally conditioned process, and we must be very cautious when explicating how any given text might have been read in earlier times. The evidence-based reconstruction of the context is done in order to reduce the number of misunderstandings—but not only that. Highlighting the context as much as I do is also a pointer towards the experiments, in which the question of context will be of key importance. An important part of the experiments is to turn my back on known historical and geographical knowledge in order to understand what the text in itself has to convey about geography. This is intended not to understand the topic of the text better, but rather to increase our understanding of how texts convey knowledge about places and the relationships between them.

4.1 The text creation events

The meetings during which major parts of the text were written are central parts of the context. The interrogations Schnitler conducted followed a strict legal structure, with sheriffs and witnesses present.[1] How was this seen by the people present at the time? Even if these court sessions had no one accused and did not sentence people to punishment, they were still part of the legal system and must have been experienced as serious business by the people involved.

Common people, in the roles of witnesses, were considered to be knowledgeable participants in the court dialogue. What does that tell us about the events? It was not as extraordinary as it may seem. In Scandinavia, the knowledge held by the common people has always been one of the bases on which borders were drawn.[2] The testimonies of common people were also important in court sessions; they were often the ones who knew.

In many sources for the history of the Sami, including those written by Schnitler, there are important traces of knowledge to be found about the Sami people, as well as about people from the Norwegian and Swedish lower classes. But in order to see these traces in their proper context—in order to understand what they may be traces of—one has to understand the writer and collector of the material. Schnitler initiated the meetings in which the situations documented in his protocols were created—the situations about which the text is a restricted source of knowledge. Schnitler did not only write the text, or let it be written; he also created the situations in which the events described in the text took place.

According to the vocabulary developed in the field of regional geography, Schnitler's role was that of a gatekeeper, mediating among a number of different folk geographies existing at the same time:

[1] This is in line with the institution called "tingsvitne", which could be used by civil servants as well as common people to document conditions such as inherited rights or economic problems (Imsen and Winge, 1999, 453).

[2] Such value is documented at least back to 1330 when a note following the treaty between Novgorod and Norway says: "These are the borders between the land of the Norwegian King and that of the Russian King, based on what was said by men in old times, as well as what old farmers and Sami people say today." ("Dessor enda merke ero millim Noregs kononghs rikis ok Ruza kononghs eftir þui sem gamler menn hafua sagt ok en sæghia [j dagh gamler bumenn ok finnar" (Keyser and Munch, 1849, 152).)

> [W]ithin any region, there are multiple geographies, varieties of geographical knowledges. . . . And there are varieties of folk geographies – those inspired by diverse belief systems and ethnic traditions, as well as those which have emerged from diverse *genres de vie* farmers, fishermen, nomads, merchants and poets. (Buttimer et al., 1999, 130; italics and missing punctuation in original)

Schnitler also made his own observations during his travels, adding to the experience he already had. In this way, he became an inner voice along with the witnesses as well as the outer voice of professional knowledge. It may be that this mix between being an inner and an outer voice made him more respectful towards the witnesses than a reporter working only from the outside would have been.

We remember from the previous chapter that he had a great deal of legal experience; Schnitler started to interrogate people when he was just over twenty years old. His subsequent career suggests that he was a good judge. This implies that he was a good listener, that he was able to understand the persons speaking, to imagine their world view. Bringing this up to the 1740s, we must assume he was able to let his own inner voice of spatial understanding and experience resonate with what the witnesses told him. He would have been able to keep his outer voice as a professional scholar and his inner voice of understanding and imaginative participation in the wayfinding stories in a fruitful relationship.

When an interview was initiated, not only the witnesses but also Schnitler and the other persons present had general knowledge of the areas of interest. The knowledge could come from maps, from previously read texts, from stories heard, or other sources. It also came from personal experience, such as from previous travels in the area. As we saw in chapter 2, slow travel on foot, horseback, or in a reindeer sledge leads to a slow change of landscape perspective, with a potential for thorough learning.

The knowledge was also based on personal experiences with landscapes in general, not just the one under discussion. They all knew what a mountain was like. An operational geographic knowledge was available in the situations, based on frameworks of geographical knowledge (Collignon, 2006, 154–155).

Affordances were also available in the immediate situation, since the interviews took place in situ. Gesture is important in all oral communication, including geographical; speakers may have indicated the directions of areas they mentioned, and some of the mountains could have been visible from the courtroom.

Were the witnesses truthful? People may have been afraid of lying under oath, for religious reasons as well as for fear of earthly punishment. However, in matters of taxation there seem to have been few such considerations among common people at the time (Jørgensen, 1969). The question of attempted lies has some relevance for understanding the relationship the witnesses had to the court. Were they loyal to its request for truthfulness? Schnitler's method, confronting one witness with statements made by others, would seem to be a reasonably safe method of detecting whether some of the witnesses were trying to lie. He also checked the facts against older documents and his own observations.

In the border examination protocols as a whole, there are a few places where witnesses say different things to the Swedish court from what they said to Schnitler. There are also some cases where Sami witnesses give a suspiciously western border, which could be in their interest in certain areas. There are two occasions documented in the protocols where Swedish Sami witnesses were accused of having lied to the Swedish courts (Schnitler, 1929, 358–59, 397–400). So even if there are numerous disagreements and questioned statements, accusations of downright lying are very rare. Being notified about lying witnesses would be of interest to the negotiators, as they could use this against the testimony given by the same individuals on the Swedish side, so we must assume that Schnitler recorded all such cases. All in all, it seems that the witnesses were in general seen as truthful by Schnitler.

4.2 Text responsibility

Being responsible for a text can be seen at several different levels. At the basic, physical level, two persons, Schnitler and Røyem,[3] each wrote parts of

[3]"Capitaine" Peter Jacob Røyem of the Størenske Company was Schnitler's writer on some of his travels (**S1**, xxxiv). He is called "*Capitain des armes*" in **S1** (145), but according to

the manuscript. However, Schnitler was the responsible leader of the process, so he would have gone through and accepted everything Røyem wrote. To what degree he actually controlled the parts written by Røyem in detail is not something I know, but I assume there was a balance between trust and control. The more he trusted Røyem, the less he would have checked his work.

To varying degrees, Schnitler renounced responsibility for some parts of the text, namely, for the interrogation records and some of the appendices. The texts of the records were written by Schnitler or Røyem based on oral sources. The statements in the records were meant to reflect what each witness said, and the texts were accepted by the witnesses as well as by the other people having roles in court. As for the appendices, they were selected by Schnitler but are, with the exception of mistakes in the transcription and of parts omitted, identical word for word to the external source documents.

The latter case fits well into the modern concept of an editor. But what about the interrogation records? Schnitler is not the author, as the responsibility stays with the person making the testimony. He is not an editor either, as he wrote the text. He is not a mere shorthand transcriber, as the testimonies are converted into prose. I will give no conclusive answer to this question, but it will be further investigated below.

Sense-making took place in the court sessions documented in **S1**. Sense-making is always situated as well as dependent on resources, such as linguistic competence, that transcend the situation (Linell, 2009, 49–51). The parties actually met and understood each other—not perfectly, but to a certain degree. Schnitler's text is not an open window into how people reflected about geography in their everyday life at the time of writing, nor is it documentation of everyday communication about geography. It is a document describing an extraordinary situation (Burke, 2001, 11). But although it documents what occurred, it is not accurate documentation of how the witnesses spoke in this extraordinary situation. The text taken down is based on what people said, but it is not a transcript of it.

Schnitler's protocols give an understanding which is pure mid-eighteenth century. The text I use in the experiments is also pure eighteenth century,

Ovenstad (1948, vol. 2: 347), he only became First Lieutenant in 1747 and Captain in 1755.

even though it has gone through several media transitions. In the printing and digitisation processes, the tokens are standardised into a fixed alphabet of characters, paragraph breaks are added, and some implicit notions have been made explicit, such as place names. Nothing fundamental to the understanding of the text is added to the textual document.[4] Everything in the digital text I use is within the repertoire of the witness, the scribe, the interpreter, and the other persons present in the courts of the 1740s. Even if no specific parts of the text can be said to be pure products of one ethnic group, occupational group, or class, the complete text consists of pure eighteenth century expressions.[5]

The fact that the digital text is based on an eighteenth century understanding is important. In part II I will describe the modelling process in which I read parts of the text in minute detail and built models based on what I read. Later, in part III, I will use this to present an understanding of what is written in the text, as opposed to what the reader brings with him. In this argument, it is vital to know the details of the creation and re-creation of the text, from the protocols of the meetings in 1742–1744 and the other sections included in the volumes, through print and digital editions, up to the models and the maps I base on them.[6]

Schnitler expressed his knowledge in the form of hand-written text and map manuscripts. How the two acts of creating the two types of expressions were related is not known today, but we must assume it was a relationship of some complexity. He drew map sketches during his travels as well as more conclusive maps after significant parts of them. For the latter maps he must have used facts found during his travels. Whether he actually re-read his summaries and drew the relevant parts of the map based on what he read, or whether he based both the text and the map sketches on similar creative processes, relying on his memory in both cases, or what kinds of methods he used, cannot be known

[4]This is because my use of the text is a reading of a series of tokens, and I consider the difference in reading speed and touch and feel caused by the difference between a hand-written manuscript and a digital text to be of limited interest. It would have been different for a scholar studying details of the original documents itself, e.g., handwriting.

[5]Eighteenth century and older, that is. There will be intertextual links back in history. But there are no such links from the text to what comes after 1745.

[6]Even if the source text I use in the experiments is pure eighteenth century, the models I make represent a mix between eighteenth and twenty-first century thinking.

to us. What is clear is that he did not make maps based on texts alone; if this was not clear beforehand, my results in part II show that it is impossible to base maps on textual descriptions alone. If he used the text, it would have been more as an aid to memory.

In the writing of the protocols, somebody held the pen, and that gave him a certain power. If we consider where the words the pen holder chose to write down came from, the text is multi-vocal throughout: nothing is purely Schnitler or purely any witness. Even impure traces can be detectable, however. Schnitler did invest quite an effort in taking down the records. Both he and his superiors saw value in it. This is a further clue that similar value may be there for us as well, if we investigate the traces of different voices we find the text.

4.3 Multi-vocality

Even if only one person held the pen during a meeting, there were still many voices in the courtroom, more or less involved in the creation of the text. We can still find traces of different voices in the text we read today. This is obviously so in the parts for which Schnitler acts as an editor, that is, in the external appendices; but it is there even in the records of witness statements. The witnesses must have claimed a part of the writing role in the mind of the writer. Schnitler must have found himself in a situation where he was narrating on behalf of someone else, the witnesses. In addition to possible model readers to whom Schnitler consciously or subconsciously addressed his text, we can see several virtual senders in the mind of the writer.[7]

Dialogism can be found at two different levels in **S1**.[8] First, in the text it is documented how it was partly created in a social situation of communication, that is, in court. And second, this text, like all texts, is read from a dialogical

[7]See Tønnesson (2004) on multi-vocality in texts written by historians for a discussion of model readers in the context of non-fiction texts. Schnitler's text creation can also be seen as a translation of the oral witness statements to written text, which links in with the concept of translation as performance. In a sense, Schnitler was performing the witnesses' statements.

[8]This is in line with the discussion in Linell (2009, 245).

perspective, in line with Bakhtin's argument mentioned above. The reader enters a dialogue with the text, and notes other dialogues the text is part of.

It is true that the power resides in the hand holding the pen, and at the end of the day, a witness is powerless in comparison. No metaphor can change that. Nevertheless, we have seen that Schnitler was a truth-seeking writer. He would have tried to be true to the speech of the witnesses, as far as he was able, and according to his understanding of truthfulness. However, he was not the only filter of the text. The dialogue in the courtroom was more complex.

S1 was written in a Danish variety which was influenced by Norwegian dialects as they existed at the time of writing. Even if many of the Sami witnesses gave their testimonies in Sami, only the Danish translations made by Christian missionaries were included. The translators obviously played a key role in forming what the Sami witnesses were recorded to have said.

Seeing a written text as something fundamentally different from spoken words is common today, but Schnitler and the witnesses did not necessarily see it that way. Still, they must have been aware that some sentences were actually spoken in court, a hand-written text was created, and the two were not perfectly congruous. The statements from the witnesses as they are written in the manuscript are in literary prose, which is quite different from natural speech (Frye, 1972, 8). Not only that, in the form a reader meets the text, it is text only; it is single-modal.[9] Its history of creation goes back to another medium, speech, but the speech would have been only one part of a total performance.

How multimodal were the witness statements? We have seen that maps were not used. But what other communicative acts accompanied their speech? Hand and body movements were of course used, at least some of them as parts of the message. All this is lost in time. The records constitute prose texts created by the scribe on the basis of the oral statements in order to represent correctly the thematic content of the testimonies. Much is lost, and must be.

Dialogue among the witnesses must also have taken place, but only vague

[9]It is disputed whether an expression can be single-modal. As we will see in part III, it is claimed in media studies that all expressions are intermedial. But **S1** as a text is much more single-modal than the meetings must have been.

traces remain of this, if anything at all. Perhaps occasionally other parties identified traces of internal dialogue in the speaker and verbalised it: "What one speaker only alludes to, is made more explicit by another" (Linell, 2009, 129). It is likely that there were a number of questions and clarifications that were not reproduced in the text. Schnitler was probably helping some witnesses develop their stories. In Smail's study of the Notaricus Publicus in Marseille in the middle ages, he shows how customers of a professional scribe often preferred a different geographical system from the one preferred by the scribe. The system preferred by the customer could influence the scribe, but would not always control the system used; the preference of the scribes for using street names would often come through:

> We must assume that the clients of the notaries, when first asked by the notary to give property sites for the purposes of property conveyance, chose to define these sites according to their own language of space. The diversity typical of vernacular linguistic cartography, at times, managed to push through whatever standard form the notaries might have been developing, because the set of extant notarial site clauses includes every possible template and all manner of toponymic styles. ...
>
> All the same, fourteenth-century notaries had a clear preference for streets, and often translated the cartographic terminology of their clients into the language of the streets (Smail, 1999, 67–68).

This relationship cannot be transferred directly to the situation in the court sessions led by Schnitler; the relationship between a customer and the seller of a service is quite different from the relationship between the King's civil servant and a poor farmer. Negotiations are, however, likely to have taken place in our situation as well.

What we have just discussed is closely connected to power relations in the court. More will follow on that topic. In general, both power and resistance may be born out of a dialogue (Linell, 2009, 216–217). There may have been many overlapping games played by different actors during the court meetings. The player we know most about is Schnitler; still, we mostly know him from his

own words. Are they really credible? I will now seek the assistance of another scholar in providing more evidence for the case that they are.

4.4 A historian's view on Schnitler's credibility

In his 1997 dissertation in history,[10] Fraenkl asks why the border ended up where it is. An important part of the dissertation consists of an evaluation of Schnitler's work, as he was responsible for providing much of the background material for the Danish claims. For Fraenkl, the question of Schnitler's truthfulness is a central one.

Questions of morality and sense of duty are problematic. Even when we consider people we know well, questions about why they do their work professionally, or why they sometimes choose to bend the rules, are hard to answer. For people several centuries away, living in a very different society from ours, we just cannot know. Some sources can give us indications as to how people behaved. But this is problematic for Schnitler's protocols, as they were under his full control.

To give some background against which Schnitler can more easily be understood, I will again use Johan von Mangelsen. He had a personal interest in the border question around Røros, as he was one of the owners of the copper works. This was known to everybody; regulations on disqualification as we know them from more recent times were not in use then. It was also known to the Swedish negotiators, and they tried to use it to get a better deal in Finnmark. But this was unsuccessful, and Fraenkl argues well for the claim that von Mangelsen did not let his personal interests influence his behaviour in a negative way for the Danish side (Fraenkl, 1997, 106–111).

Even if Fraenkl is clear about the standards of the eighteenth century being different from those of today, he is not entirely clear about what he means by expressions such as "irregularities".[11] Is something irregular compared to

[10]The dissertation was at the level of a Norwegian 'hovedfag'. 'Hovedfag' is often translated to 'master thesis', but were traditionally longer and represented more of a research project. In some disciplines, not the least history, a 'hovedfag' was closer to an Anglo-American PhD than to a master thesis.

[11]"uregelmessigheter"

today's standards, to Schnitler's instructions, or to an eighteenth-century moral standard?

As for Schnitler, we can isolate two documented aims for his work, and they can be seen as incompatible under certain conditions. He was working to draw the best possible border for the Danish side, and he was instructed to be truthful. Fraenkl examines his methods and investigates his possible use of questionable methods, such as selection of positive witnesses, influence on witnesses before hearings, omitting parts of the statements, and bribes. His conclusion is that

> Even if it is difficult to say to what degree irregularities took place, it seems clear that it did not characterise Schnitler's work anywhere near the degree to which it could have.[12]

Schnitler did not call on the witnesses to lie; on the contrary, he explained the oath and its request for truthfulness very clearly. This is in line with Colonel Rømeling's detailed instruction to Schnitler, discussed in section 3.3.5, in which he stated that it was not in the King's interest to demand more than what was rightfully his because of errors in Schnitler's documents.

Schnitler reported how he questioned witnesses' views when they were too Swedish-friendly—if he had omitted the Swedish-friendly evidence, such reports would not have been present. In a few cases in which he did press his witnesses, it is clearly shown in the transcripts; this was important information for the future use of the protocols and for understanding what one would assume to be the Swedish position. In one case he omits altogether three witnesses' evidence that was slightly less favourable to Denmark than the included witness statements. The fact that he mentioned such details further increases his credibility.

I find Fraenkl's investigation valuable, but I have a slightly different view of Schnitler's goals. It seems that Fraenkl sees a possibility for Schnitler to tell lies that would help the Danish case. I doubt if that would have been possible. If

[12] "Riktig nok er det ikke lett å si i hvor stor utstrekning uregelmessigheter eventuelt fant sted, men det virker åpenbart at de ikke preget Schnitlers arbeid i tilnærmelsesvis den utstrekning det hadde vært anledning til å la dem gjøre" (Fraenkl, 1997, 33).

Schnitler's main interest was to serve the Danish kingdom, and the possibility that he went to war because of King Frederik's visit to Rostock could indicate a more than average loyalty towards the crown, then this is in full harmony with an ideal of truthfulness.

His task was to find out where the border was, based on the evidence he collected. His reports would go to his Danish superiors and stay under their control. When parts of his reports were exchanged with comparable court transcripts held by the Swedes, the selection of the parts to be handed over was under the full control of the Danish government (Fraenkl, 1997, 15). If witnesses, or groups of them, would stand up in court in Norway to give evidence unfavourable to the Danish side, they would surely do the same in Swedish courts. Including such material in Schnitler's protocols was in the Danish interest, because it would better prepare the Danish side for the Swedish claims, and give them more time to find counter-arguments and prepare a strategy.

So being a truthful investigator was fully in line with doing the best possible work for the Danish government. Giving the Danish government a more positive story not supported by the facts would only weaken its case. Even facts unfavourable to Denmark that were not known to the Swedes should not be concealed by Schnitler. The Danish government would be as able to keep them away from the Swedes as Schnitler would be to hide them from his superiors.[13] If Schnitler saw himself as a loyal servant of the King, he would have had no reason to lie, because lying to one's superiors in his situation would be in the interest neither of them nor of the kingdom.

4.5 Conclusion

The text in **S1** is not truly Sami, or Norwegian, or Danish, or Western, or First Nation. It is a mix of all of those, and more. It is a mix between groups, each of them far from pure. The Sami sense of space and of wayfinding in a

[13] I have not seen any evidence of Swedish spies present among the Danish border officials, but I have not investigated it either. Such presence, or Schnitler suspecting it, could weaken the argument presented here.

landscape is itself a complex blend of several cultural perspectives. The same is true, though to a lesser degree, for the Norwegians, Danes and others. Schnitler had his limited understanding of all the above, filtered through whatever he knew from his formal education, war experience, and life in Trøndelag, where he belonged to the upper circles as an officer while also working among the peasant soldiers he was commanding. What we do know is that the manuscript is actually from the eighteenth century. Further, for our purposes, the printed and digital versions are also from the eighteenth century.

Because of the complexity of the historical and cultural background of **S1**, it became a very rich textual expression, and as such, a good object of study for my experiments. They will be the topic of the next part of this thesis.

Part II

Experiments

Chapter 5

Experiment setup and model building

The starting point for this part of the thesis is a text and a hypothesis. The text, **S1**, was described in detail in part I, whereas the hypothesis, which was presented on page 14, can be condensed as: *If we create a map based on a text, something important is lost.* In order to evaluate the hypothesis, **S1** has been studied closely by running a series of experiments on a computer-based conceptual model of the text. The whole of the text has been modelled extensively, whereas some short sections were modelled in great detail, and thus treated intensively.

This part of the thesis will show how the results from the experiments support the hypothesis.[1] When all the spatial information which can be read from small sections of **S1** is extracted from the text into a model and maps are made based on this model, we cannot avoid losing something important. I will describe in detail how the experiments were done, and what exactly was lost in the process from text to map. I will also show that the loss of information was not caused by the modelling itself, but rather by inherent differences between **S1**, on the one hand, and maps as they are defined in this thesis, on the other. All the answers found in this part are based on **S1** alone; a generalisation of

[1] A thesis based on experimental work is a rather different genre from what is usual in the humanities. It is necessary to describe what I actually did, whereas the usual procedure for the humanities is to subsume the process of research in the logical structure of an argument.

the results will follow in part III.

This part consists of two chapters. The first presents the setup, which is the computer-based environment and the way it is used. Then, in chapter 6, a series of case studies is presented in which parts of the source text are analysed in order to test the hypothesis.

The model is established in a computer application I have developed, called GeoModelText. In this chapter and the next I will describe the experiments and the results found in them; thereby the process will be *explained*. In order to understand more of the actual modelling and experiment processes, the *implementation* found in the data package, including the source code for GeoModelText as well as a runnable java applet and the datasets, should also be studied.[2] This applies especially to anyone who wishes either to replicate the experiments or to use parts of the tools for other purposes.

This chapter will start with a summary of the experimental process, with some remarks on the methods used. The process consists of five stages:[3] the *text*, which is the starting point, the *primary model*, the *formalised model*, *vector data*, and *maps*, which is the end result. Each of the stages will be described in more detail in the following sections, before this chapter concludes with some preliminary results.

5.1 The experimental process

The goal of the model building was not the model as such, but rather the process of modelling—that is, to learn from creating and manipulating the model. How did this learning take place? What happened during the process of model building that provided new insights? Which methods and tools were used?

[2]The data package is described in chapter 9.

[3]I use the word 'stage' to denote an overall structural milestone in the modelling process, whereas 'step' refers to each transition in the modelling of one specific fact.

5.1.1 Learning from a model

Models as they are discussed here are representations of something which are created for the purpose of studying what is modelled more closely (McCarty, 2005, 24). In this case, **S1** was modelled. I studied its expressiveness by manipulating a model of the text. I had some initial ideas about the kinds of results to be found; however, it turned out that some of the main findings were not what I had anticipated, so I had to adjust my understanding as well as the modelling. The process of adjustment was repeated several times.

Experiences from the modelling also helped in developing the tools. The initial modelling work and preliminary experiments gave feedback to the continued development of GeoModelText. The modelling showed what the mechanisms of the system needed to be, and this made it easy to try out and alter the functionality of my modelling system as I went along. The model building also helped me to discover what text—that is, which parts of **S1**—to use in the case studies.

So modelling was used in the development of the setup of the system, as well as in preparing for the use of the system in the case studies. The model was then used extensively throughout the case studies. The various aspects of modelling open different perspectives on the work and also on the results. However, the separation between the various aspects of modelling was not clear in the earlier stages of the process, and, as will become clear in the following, distinguishing fully between them is not possible even now.

Most of the experiments were performed in a qualitative manner. Counting and comparing occurrences in the model to find results were done in only a few cases, and the quantitative methods I did use were quite simple. Mostly, the occurrences were evaluated individually in line with traditional research in the humanities, in which knowledge about specific instances of a textual phenomenon is in the first instance the main goal (Galey, 2010, 99).

The computer application developed for the modelling, GeoModelText, is not meant to be used for a full analysis and modelling of all information, or even all geographical information, in the source text. It has been created in order to analyse enough to make inferences about how the source text works in the context of the hypothesis to be tested.

The process of modelling consists of extracting simple assertions made in the text. When a number of such assertions are formalised and interlinked with one another, a surprisingly complex structure is established, showing how much there is to even quite commonplace processes and assertions. This also shows how incomplete our knowledge is, and how easily we skip over details in order to get to the big picture. GeoModelText offers rich manipulatory power over the interlinked set of assertions. This power has been used to pinpoint details in how the text works and how it is different from maps, as we will see.

The choice of the verbalised form, that is, 'modelling' rather than 'model', is no accident. The computational model as a fixed structure of knowledge was not a goal in itself, but rather a series of temporary states in a process of coming to know. The point of a modelling exercise lies in the process, not in the model as a product.[4] The use of a computer sharpens the distinction between a model and a concept. The model invites us to manipulate it, as it is set up as an interactive system. Interaction with the computer is doubled when computer programming is a part of the research. In addition to the interactivity one has as a user of a system, one also has the interaction of a developer with the computer.

The modelling methodology discussed in McCarty (2005) has clear similarities with the view of wayfinding we saw above, where learning a landscape and how to find one's way through it happens through moving in the world. According to Campbell (1960, 380), all genuine increase of knowledge takes place by a process of "blind-variation-and-selective-retention".[5] Vincenti (1990, 242–243), transferring the idea to the area of airplane engineering, stresses that 'blind' in this sense does not mean random, nor unpremeditated, nor unconstrained; it just denotes that in order for the outcome of the variation to be new, it cannot have been completely foreseeable. Blindness starts where past knowledge ends. We do not know fully what will happen along the way we walk. Even if the landscape may be known in great detail, other aspects (e.g., the weather) are

[4]This is in line with the focus on languaging rather than language in dialogism, cf. the discussion in part I above.

[5]Campbell used the word "blind" because "real gains must have been the products of explorations going beyond the limits of foresight and prescience, and in this sense blind" (Campbell, 1960, 381).

not; there may be fog. Knowledge is always partial. Like an infant making the world real to himself or herself by acting on it, we make the landscape real by travelling through it, and we make our models real by manipulating them.

The analogy between wayfinding and modelling is intriguing, and we will return to it later. It does, however, have its limitations. The goals of the processes are different; learning about a text is not the same as reaching the place one is aiming for in the landscape. Further, "manipulation" is not a natural way to think of wayfinding; we do not interact with the landscape by manipulating it, but rather by moving through it. But for both modelling and wayfinding, it makes sense that the knowledge gained is gained through active engagement, with the model in one case and with the landscape in the other.

In exploratory modelling, predefined vocabularies are problematic. Standards are important, and in my project I use them in many areas. Shortly I will present the two most important ones for the modelling, CIDOC-CRM and TEI.[6] Using standards in modelling is dangerous, and we will see an example of that in the case of TEI below: the underlying technology makes it difficult to do certain things. The system lets use see only what it shows us. This is more than just a practical problem. A model is a simplification of a complex phenomenon, in my case something expressed in ordinary language. Any standard, even an open and extendable standard such as TEI, creates this model in certain ways. We run the risk of not seeing what is outside the ways of the standard (Zafrin, 2007, 66). The same applies to CIDOC-CRM. By using it as an inspiration rather than as a complete system, I reduce the risk of being unsoundly limited by it.

Any model will adhere to a modelling language, but this language may be more or less specified, and more or less mutable during the time frame of the experiment. It is impossible for any human being to see all the possibilities, but a skilled data analyst still has the ability to see a phenomenon from different angles. The experience used in this work is partly gained from the study of standards, but the standards were set aside before the actual modelling work started. The work was exploratory, led by experience and knowledge. It

[6]ICOMs International Committee for Documentation—Conceptual Reference Model and Text Encoding Initiative, respectively.

was informed by TEI and CIDOC-CRM, but not restricted to any predefined modelling language.

5.1.2 CIDOC-CRM

The implementation of the model was in line with the principles behind CIDOC-CRM, which is a modelling language used to describe the implicit and explicit concepts and relationships found in cultural heritage documentation.[7] CIDOC-CRM has not been developed as a tool for modelling readings of texts, but it is still useful as a guideline for such modelling, as shown in Eide (2008). As a simple example of how this may work, consider the following sentences, taken from the introduction to a court interview:

> Of the witnesses supposed to be the most cunning on the border issue, were and stood up in the court 1: Ole Larsen *Riise*, ... For these the Kingly *Order* was read out loud ... and they gave their *Bodily* Oath —[8]

Assertion	**Source**
(1) There is an x who is a witness	The text
(2) x is a person	The meaning of the word 'witness' and 'person' in this context
(3) x gave an oath	The text

Table 5.1: List of assertions based on statements in the example text.

Several assertions can be read from this example, including the ones in table 5.1. The model in figure 5.1 is based on the assertions in table 5.1, thus also on the statements in the quote. In figure 5.1, the rectangles with captions starting with *E* represent entities, whereas the ovals with captions starting

[7] CIDOC-CRM was made and is still developed by interdisciplinary teams of experts under the auspices of ICOMs International Committee for Documentation. Webpage: http://www.cidoc-crm.org/ (checked 2012-06-22).

[8] "Af Viidner, som skulde være de Kyndigste paa grændserne, Fandtes og fremstillede Sig her for Rætten 1: Ole Larsen *Riise* ... For dennem blef høyst bem^{te} Kongl: *Ordre* lydelig oplæst ... og de aflagde deris *Corporlig* Eed —" (**S1**, 1).

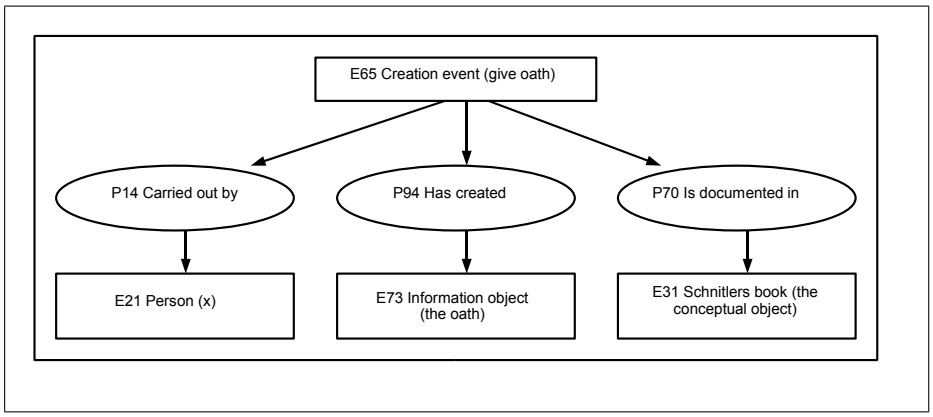


Figure 5.1: Example of a CIDOC-CRM model based on the assertions in table 5.1, thus also on the statements in the example text.

with P represent the properties linking each of the three triples[9] together. The rectangle on the top is the domain of all the three triples, whereas the rectangles on the bottom are the ranges. The model in figure 5.1 focuses on the event of swearing an oath. This event was carried out by a person. Through this event, the oath as a conceptual object was created, and the event was documented in Schnitler's text. Other facts are not included in the model—for instance, that the name of the person in question is Ole Larsen Riise.

What was shown in this example is too simple to be useful as anything more than an illustration. But such small building blocks, consisting of entities and properties, can be used to make statements about the world as it is described in the text, in a way that the computer can sort, arrange and combine.[10] Once we have a number of such statements, the computer can be used to investigate them. Such investigations are vital to the experiments. Some 35,000 names,

[9]A triple is a subject-predicate-object statement expressed in a formal language. In CIDOC-CRM, the subject of the triple is called the domain, the predicate is called the property and the object is called the range. I use the same terminology in my modelling.

[10]We saw in part I examples of expressions such as "the map says", which were actually anthropomorphising; the map says nothing, it is we who read it. The same is the case here: the computer does nothing in the sense of having an agenda, so when we use expressions such as "the computer sorts the data", it actually means that someone uses a computer to sort the data, although it may be unknown to the computer user who initiated the sorting. Such expressions are not only a fundamental feature of human languages, but also an example of how we see our tools.

other references to places, and co-references, as well as other links between elements, are stored as statements in the CIDOC-CRM-inspired formalism in GeoModelText. This dataset, with its close connection to the source text and the ability to manipulate it, is the core of the experimental system.

The thinking behind CIDOC-CRM is exactly what was needed for this project. It combines event-oriented modelling with a solid understanding of cultural heritage based on the study of many information systems and discussions with many professionals.[11] The central idea of CIDOC-CRM is that the notion of historical context can be abstracted as things, people, and ideas meeting in space-time. The model also contains identification of real-world items by real-world names ("appellations"), a generalised classification mechanism ("types"), temporal entities, and location of temporal entities in space-time and physical things in space, along with many other things. TEI has also been shown to be reasonably well in line with CIDOC-CRM (Ore and Eide, 2009), which makes it convenient to build my CIDOC-CRM-inspired system on top of information from my TEI source documents.

CIDOC-CRM was used as an inspiration; I did not adhere to it as a formal system. CIDOC-CRM-conforming models are both wider and narrower than the models I made: wider because CIDOC-CRM is a core ontology,[12] going beyond the day-to-day level of implementation detail that I need to address; but narrower, because it strives toward a true model of its area of study. An instance of an information system based on the ontology should be in line with our best understanding of the historical circumstances, whereas the model in itself should be free of contradictions even if the instantiation data may be contradictory. In this project, however, a model of text reading was built up

[11] One of the uses I made of the standard was to study the way it was developed, by taking part in the meetings of the CIDOC CRM SIG. I am grateful to the SIG, and especially the chair Martin Doerr, for this opportunity, which was of significant importance to this project.

[12] "Ontology" is a polysemous word, with a large and somewhat fuzzy meaning potential. I will not discuss the tradition of philosophical ontology here, see, e.g., Hofweber (2011) for an overview. A presentation of ontologies from a computer science perspective can be found in Gruber (2009). Attempts have also been made to connect the two, see, e.g., Zúñiga (2001). In computer science, the word is used to denote practices and results of practices in data modelling, in which a formal model of what exists in a specific domain is built up. The "core" signals that the model does not have classes for particulars; there is a class for "Place Appellation" but no class for "London".

which had no other scope than what was known by an eighteenth-century military officer, and which might include all sorts of contradictions and vaguenesses found in the text.

This tension between CIDOC-CRM and the project models was productive also in the process of stepwise formalisation, where I used RDF,[13] a modelling language which demands less semantic investment than CIDOC-CRM. An example may clarify this: At the basic level of RDF expressions, one can make the statement in sentence 5.1. An animal, or even a fictional person or a spirit, may be an actor in RDF. The concept of being an actor is not really modelled in RDF; "created" is just a label of a property.

$$\text{the eagle} \rightarrow \text{created} \rightarrow \text{the mountain} \tag{5.1}$$

In CICOC-CRM, on the other hand, the role of being an actor is restricted to human beings, because in museum activities, as well as in historical facts seen from the perspective of a museum database, nonhuman actors do not exist. CIDOC-CRM does not deny that there are thought systems, as well as computer-based implementations of models of such systems, in which nonhumans can be actors, but such systems are outside the scope of CIDOC-CRM.

So I use the ontology as an aid in my modelling work, as one of the sources of inspiration and as a rigorous contrast to my text-based modelling. "[CIDOC-CRM] is also thought as an intellectual guide in the requirements analysis and conceptual modelling phase of cultural information systems" (Doerr, 2003, 79). This is in line with my use.

[13]Resource Description Framework (RDF) was created as a language for representing information about resources on the World Wide Web. Webpage: http://www.w3.org/TR/rdf-schema/ (checked 2011-11-23). The RDF data model is based on the idea of making statements about resources in the form of subject-predicate-object expressions, that is, triples, similarly to what we saw in CIDOC-CRM above. I use triples both in the primary and in the formal models. In the latter I use RDF triples to express statements from my model at a certain level of formalisation.

5.1.3 Overview of the modelling stages

The modelling process consisted of five main stages.[14] The first stage is the starting point for the experiment, which is the *text*, imported as a digital document. The next stage is the *primary model*. At that stage, a set of statements is added in a form inspired by the ones we saw in CIDOC-CRM above.

$$\text{Schn1\_8936 (Røvola)} \rightarrow \text{direction: north} \rightarrow \text{node48 (a valley)} \tag{5.2}$$

$$\text{node48 (a valley)} \rightarrow \text{has-width} \rightarrow \text{node49 (some } \frac{1}{4} \text{ mile)} \tag{5.3}$$

In sentences 5.2 and 5.3, we find examples of such statements in the form of triples. The statement in 5.2 expresses the fact that the text claims that north of the place referred to by the name "Røvola" there is a place referred to by the referring string "a valley". The statement in sentence 5.3 expresses the textual claim that the valley from the previous example is approximately one-quarter mile wide.

Based on the primary model, the *formalised model* is developed. The process from primary to formalised model consists of bringing all the statements to the same level of explicitness. In our two example sentences, several steps are made. The property of the triple in 5.2 is changed to "Direction: 0°". This implies that a choice has been made as to what "north" means. An important function of GeoModelText is that it opens up the possibility of changing such choices, in order to test different interpretations of expressions such as "north"; other values, e.g., 5° or 350°, can be tested. The property of the triple in 5.3 is changed to "spaceHasWidth", which is not significantly different from the expression used in the primary model; it is only a reformulation.

[14] I did consider various alternatives for these stages. Based on the experience from the preparatory phase I ended up with the stages presented here, which all have useful explanatory power. Seen from the perspective of my work, the process of developing and testing the tool was a learning process which clarified to me how exactly stepwise formalisation could be put to service in this project. The history of this process is documented in the data package.

Information is lost in the former transition, but not in the latter. Such loss of information will be discussed further below under the term "fall-off". In the triple in 5.3, the range is also changed. An interpretation is made of what "mile" means in this context, so that the value "some $\frac{1}{4}$ mile" is replaced by "2 kilometres". This is a significant change, based on a choice, similar to what happened to "north". Thus, information is lost in this latter case as well.

The next stage is the *vector data*. Vector data is a set of mathematical expressions representing places in a geometrical space. The process of creating vector data consists of placing each of the places referenced above, the ones represented by "Schn1_8936" and "node48", in a mathematical vector space based on the relationships between them. Such vector data can be expressed as *maps*, which is the final stage. Making maps is a process of expressing the vector data as figures.

5.1.4 Stepwise formalisation and fall-off

The system of stepwise formalisation is central to the modelling method I use, and the computer tool GeoModelText is implemented to support it. I will now go though a simple example in order to give an overview of the process. It starts with the short sentence in the "text" column of table 5.2 and ends with the illustration of map visualisation in figure 5.2. The text is presented in English in order to make the process clearer.

Text	**Primary model**	**Formalised model**	**Vector**	**Map**
Some $\frac{1}{4}$ mile east of A is B	Some $\frac{1}{4}$ mile Direction: east	2 kilometres Direction: 90°	$A = (0, 0)$ $B = (2000, 0)$	Figure 5.2

Table 5.2: Example of stepwise formalisation from text to map.

Different types of expressions will vary in how much they are changed from one stage to the next in the formalisation process. In some cases there is not much added in formalisation from text to primary model. "East" is an example of this. The directions are kept as words in the primary model, but translated from Danish and formalised into standard English spelling following a system of 16 directions: north, north-north-east, north-east, etc.

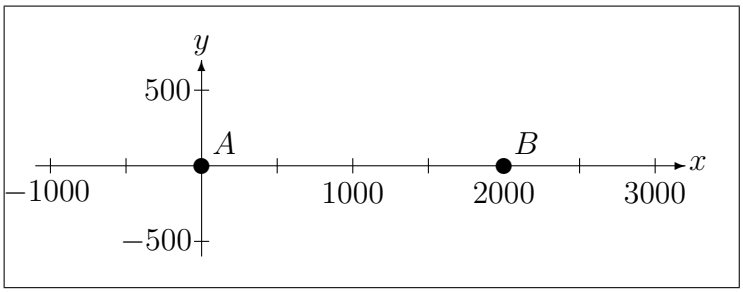


Figure 5.2: Graphical representation of the model in table 5.2, showing how the points would be put on a map.

Other types of expressions need more formalisation at this level, such as distance. The number is reformatted from a fraction to a decimal number, and the type of mile is expressed explicitly. The fact that it is not clear from the textual context what type of mile this is, whether it is a "new", "village", "mountain" or another type of mile, is expressed in the name used in the primary model, "unknown mile".

In proceeding from primary to formalised model, a recalculation of the distance from miles to kilometres is done. One unknown mile can, thus, be seen as 8 kilometres. As for the direction, the word "east" is translated into a number, in this case, 90°. In order to reach the stage of the formalised model, I had to make important choices, for the distance as well as the direction; they could both have been otherwise. This is a key point to which I will return several times.

Moving on from the formalised model to vector data, the distance and the direction are taken together. We choose to put A at the origin of the vector room.[15] Once that is done, and as B is 90° from A, and 2 kilometres away, the coordinate for B gives itself. Figure 5.2 shows the vector data as they would have been expressed on a map.

Some of the steps above were based on calculations, while others were choices to be made within a more of less restricted room of possibilities. There is, as it were, a difference between clarification and conversion on one hand, and making choices on the other. The aim of the rest of this chapter and the next one is to see how information from real chunks of text "travels" through

[15]The origin is the coordinate $(0, 0)$.

this process. What is lost on the way? What must be added in order to reach the goal? Some possible answers have already been indicated; vagueness was lost in this example.

Each stage in the modelling process includes both more and less information than the previous one. More information is added, for example, when clear entities and properties are established based on vague or uncertain statements in the source text, as when a measurement of "6 miles" is formalised to 48 kilometres. But the same change can also be seen as a removal of information. Vagueness, which can be an expression of openness and interpretability, is reduced.

The most significant loss of information happens because most of what I read from the text is out of scope and not included in the model at all. The aim of the modelling is, after all, to include only what I consider to be geographical. So there is already significant reduction of complexity in the conversion from text to primary model. But in addition to what I choose to omit because it is out of scope, it may be that things are omitted because I cannot include them. So already here we may find results—that is, we may see that some types of information are lost from one stage to the next because it is impossible to include that information in the version of the model at the next stage. It "falls off". I will use the phrase *fall-off* to refer to this, both as a verb (to fall off) and as a noun (a fall-off).

What has just been described is the process of stepwise formalisation. For each small step, the model becomes a little bit more formal. In the process, the fall-off—what is difficult to avoid losing—is the interesting part. The fall-off will include things that cannot survive a transfer from one stage to the next, which misses the different level of formality. This includes, for example, a direction such as "east". In a system where one must add a specific number of degrees, such as 90, the ambiguity of the word "east" falls off.

Through this process I translate a set of geographical information from one medium to the other. The series of fall-offs shows me what is lost in the process. Not all that is lost is necessarily lost because of differences between the media, but the fall-offs include candidates for further examination. The process is necessarily iterative and includes a close human-machine interaction.

It must be stressed that the concept of fall-off does not imply that information is actually lost. The data representing each and every step in the process are stored. The more formalised versions, the ones from which something has fallen off, are the ones used in the later stages, but each step in the process is kept available for later scrutinising.

The idea of fall-off handling is not only a part of the use of GeoModelText, it was also an important part of the software development method. Whenever one of the algorithms gives up because it faces data or combinations of data for which no handling is implemented, a report is written to a log file in which problems are documented. The issue can then be addressed. If it is a correctable problem, it can be fixed if it is needed for the research. This implies that the development of the computer programme is done in an iterative fashion where I limit unnecessary writing of complex interpretative algorithms that are never or only rarely used. Further, some of the issues written to the log file pointed me towards research findings, because they represent anomalies in the material, and such anomalies sometimes indicate interesting situations.

As we see in sentence 5.4: modelling in this project is transitive. This explains why the map is a model of the text. In each step of the stepwise formalisation, the next stage can be seen as a model of each of the previous stages, so that both the primary model and the map are models of the text.

$$\text{model}(A, B) \wedge \text{model}(B, C) \Rightarrow \text{model}(A, C) \tag{5.4}$$

However, we must remember that even if a map is a model of the text, it is far from the only one possible. There are always other choices that can be made, from the simple level of the choice of a value at a specific step all the way to the overall methodological choices. Even if something falls off in the modelling process from text to map, it does not follow that it cannot be expressed as an element of a map. It could be that it cannot make it through my system of formal models even if it could have been expressed in a map. So the list of fall-offs is not a list of textual features that cannot be expressed in maps, but rather a list of candidates for types of expression that cannot make

it to the map: candidates for further study.

5.2 Starting point: the text

The text of **S1** was the starting point for the model building. The description of it will cross over into the next stage, the primary model, because there is no clear-cut boundary between the two. After all, the stages are milestones in a process, not isolated elements.

The relationship between edition and complete work is complex in the case of Schnitler and the border archives.[16] The text of **S1** does not represent a complete work. It only includes parts of the protocols written by Schnitler; other parts were published in 1929 and 1985.[17] Further, the protocols only constitute parts of Schnitler's border-related work, and an even smaller part of the whole documentation of the border process. So the text I started with was already a fragment.

The whole of **S1** is modelled extensively; that is, all names and all recorded co-reference links are included in the model. Some selected parts are modelled in greater detail. In the initial modelling and experiments described in this section, these parts were chosen quite randomly. The aim was to assist in the development of GeoModelText, as well as to learn more about the method to be used and how the different parts worked in experiments. This led to the insights I needed in order to choose the parts of the text to be experimented on in the case studies described in chapter 6. I used the whole of **S1** extensively, but only the parts modelled in detail were used intensively.

The method used in this research works well on fragments of texts. The experiments are not about completeness in the sense of the study of a complete text. The hypothesis is formulated in a way which makes it irrelevant for testing

[16] I use 'text' and 'work' in line with the tradition in scholarly editing in which works are instantiated as texts; see Gabler (2012) for a discussion with further references.

[17] Schnitler (1929) was made as part of a document collection used in the negotiations between Sweden and Norway after the dismantling of the union in 1905 (Lae, 1977). It was an excerpt of Schnitler's protocols which was selected by what was needed in the negotiations. Because the first parts of the manuscript were not included, it was published as volume II. The printed volumes I and III, **S1** and Schnitler (1985), includes the rest of the protocols. For further information, see Eide and Sveum (1998).

it, whether a full or a partial text is used in the experiment, as long as it is long enough to show the features in question. The parts of the source text modelled in great detail are sufficient for that. Each of the text fragments offers a good understanding of a landscape to an informed reader. All statements about the spatial world in these pieces of text are modelled in detail. That is the type of completeness needed for the experiments.

The description of the history behind Schnitler's border protocols in part I above ended when the border treaty was signed and implemented. The political role of the documents was over, and they were stored in the national archives, first in Copenhagen and later transferred to Oslo. Then, in the twentieth century, the protocols attracted renewed interest, this time not only as political and legal documents, but also as historical sources. They were published in three printed volumes (**S1**; Schnitler 1929; Schnitler 1985). This, as well as the creation of a digital version of **S1** in the 1990s (Eide and Sveum, 1998), showed the importance of the material, later to be confirmed by UNESCO's Memory of the World programme.[18]

The digital text is based on the printed edition, **S1**. When this project started, the digital version of **S1** was available as a TEI-encoded text. In an earlier project, a software tool was written in order to assist analysis of the text (Eide, 2004). The system is no longer used, but the information created in the project was exported as a TEI-encoded appendix to the digital version of **S1**. The appendix includes a register of all the witnesses found in **S1**, together with references to the paragraphs of **S1** for which they were the sources—that is, to the paragraphs making up the testimony of each witness.

What is a TEI document, and how can it be used? The Text Encoding Initiative was initiated in 1987 and is now a membership organisation developing and maintaining a set of guidelines for text encoding.[19] The purpose of text encoding is to make explicit, computationally tractable statements about the text. These statements are inserted as tags in the digital text according to specifications found in an encoding system. An example of how this is done

[18] A reference to the inclusion on the UNESCO list can be found in footnote 11 on page 58–59 above.

[19] TEI webpage: http://www.tei-c.org/ (checked 2011-11-15).

Af Viidner, som skulde være de Kyndigste paa grændserne, Fandtes og fremstillede Sig her for Rætten 1: Ole Larsen *Riise*.

Figure 5.3: An example text taken from **S1** (1). An English translation of the text can be found on page 107.

```
<p>Af Viidner, som skulde være de
Kyndigste paa grændserne, Fandtes
og fremstillede Sig her for Rætten
1: <persName>Ole Larsen
<hi rend="italic">Riise</hi>
</persName>.</p>
```

Figure 5.4: Simplified TEI fragment representing an encoding of the text in figure 5.3.

can be found in figures 5.3 and 5.4. Text encoding includes making a model of the text; in the example, we see how this model is inserted in the form of tags in a digital document: <**p**> means paragraph start and </**p**> paragraph end, <**persName**> and </**persName**> show the start and end of a personal name, respectively, whereas <**hi**> and </**hi**> means start and end of something with a special type font, in this case italic, shown by **rend="italic"**.

TEI represents an open and extendable system, but it still puts some restrictions on how texts can be modelled. It is based on a number of assumptions and choices. These choices "bring certain things into focus and blur others, allowing us to pay particular attention to particular aspects of what's out there" (Unsworth, 2002, sec. III.1). The TEI model of a text is based on a specific reading or set of readings of the text. The restrictions of TEI define the kinds of models that are possible to express in TEI-conformant documents. Representations created in TEI highlight some aspects of the text at the expense of others.[20]

A TEI document is an XML document. The structure of any XML document can be seen as a tree structure, which can be expressed in a context-free language. A context-free language is a formal language which can be generated by a context-free grammar.[21] It follows from the context-free structure that

[20]Thus, a TEI representation can be more or less useful. This is in line with our discussion of metaphors in part I. Like a metaphor, a TEI representation can be more or less true to the original. This is an important question. However, in research based on the encoded text, the question of how useful the representation is, is also important.

[21]Context-free grammars are important in linguistics and computer science, but neither they nor other types of formal grammars will be discussed further here. See Grune and Jacobs (2008) for a thorough coverage.

no elements overlap—that is, each element nests completely within another element. Overlap breaks such nesting, and a structure that includes overlap cannot be expressed by a context-free grammar. In an encoding with overlap there is no hierarchy of content objects. An example of overlap is shown in sentence 5.5; the **b** opens within the **i**, but closes outside it.

The italic is bold, but bold is more. (5.5)

Sentence 5.5 seems to be taken from an XML document, but because of the overlap, it is not an XML fragment. The structure of sentence 5.6, which is an example of an XML document fragment without overlap, can be expressed as a context-free grammar, so sentence 5.6 represents a tree structure, which 5.5 does not.

The italic is also bold. (5.6)

In the text encoding community, there has been discussion on whether or not texts in general have structures which can be expressed as context-free grammars.[22] Today, the general consensus seems to be that there are indeed overlapping structures in texts, but such overlap can be modelled through various work-arounds within TEI, even if TEI is indeed an XML formalism based on a context-free grammar (TEI Consortium, 2012, ch. 20).

Creating editions of pre-existing texts is the most important area of use of the TEI guidelines. The methodology of my research is different.[23] How does the model building in this project relate to the TEI-encoded document,

[22]The claim was stated most clearly by Renear et al. (1996), whereas other views of texts have been fronted, e.g., by McGann (2001).

[23]Even if the encoded text in a scholarly editing project also represents a model of the source text, the main goal of text encoding in such projects is not the modelling process but rather one or several published editions. This is in line with Ingold's division between mapping and map making we saw in chapter 2: a story told may involve the creation of a map without the map being an intended end product, as in modelling as described here. Another situation is map making, which is in this respect more like scholarly editing with an edition as the main goal.

on the one hand, and to the text as such, on the other? The TEI version of **S1** represents a starting point for my project. It is a good starting point because the TEI file includes useful machine-readable information about the text. But I had to go beyond what is conceivable within a TEI document. The TEI document is partly left behind and replaced by a richer and freer system.[24] I needed a tool where I could enter statements which are based on the text but not bound to the structure of it—neither to the linear structure of the intended reading order of **S1**,[25] nor to the tree structure of the TEI document. What I needed in order to build my model was difficult to process in an XML-based formalism.

The formalism of triples was more useful. Utterances in the form of triples make up the core units of the computer-based conceptual model I developed. However, I still needed to maintain both the linear structure of the text and the tree structure of the TEI document, and I needed to do so in an adaptable system. To the best of my knowledge, no modelling tool existed which integrated the linearity of the text, the hierarchy of the TEI document, and the triple structure of conceptual models in the way I needed to combine them. So I developed my own.[26]

Why were all these three aspects necessary? An example of actual modelling using GeoModelText will indicate an answer. Figure 5.5 shows the main data entry screen, which includes three main windows. In the window to the left, the text can be seen ("Paa den Nordre Siide ..."). The linearity of the text is needed in order to read it, letter by letter and word by word. The TEI structure of the document is also present, albeit less directly visible. For one thing, the tags can be shown, so that the view similar to figure 5.3 is replaced by a view similar to figure 5.4 in the left window of figure 5.5. This is below the level

[24]The weakness of TEI for my use is one of the main strengths of TEI for many other users. In many a scholarly editing project the limitations I cannot accept represents a useful organising structure to the work. It is well established in digital humanities that different tools give different levels of manipulatory power and thus open up for different types of research.

[25]The linearity of texts is a deep topic to which I will return in part III. For now, it suffices to say that most of **S1** has a clear intended order of reading.

[26]A full functional description of the tool is not given here. I will, however, describe the main elements of the tool when I describe how it was used. More detailed documentation can be found in the data package.

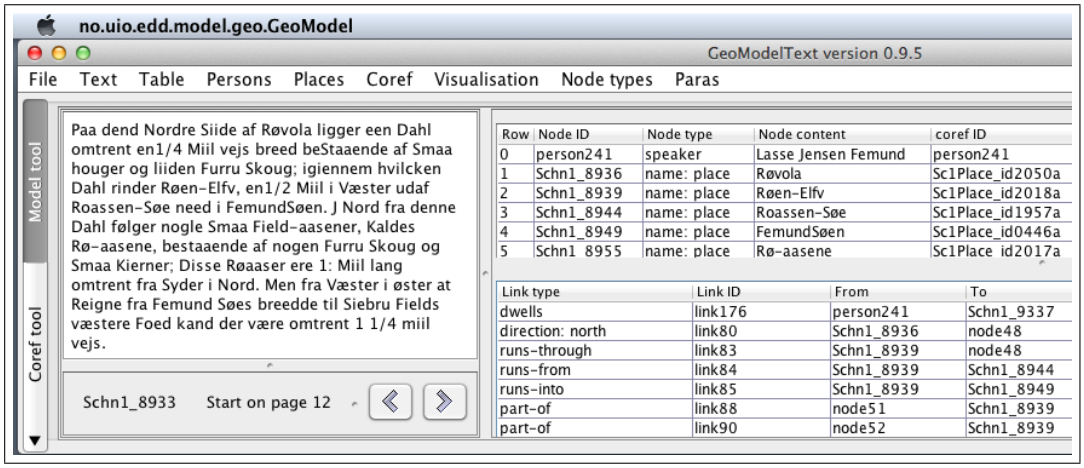


Figure 5.5: Screenshot from the modelling tool.

of the paragraph. Structural information captured from the TEI document is also included at higher levels—for example, the number of the page in **S1** from which the text was taken and an identification of the current paragraph. Examples of this can be seen at the bottom left of the screen.

The data imported from the TEI document also include information which goes beyond the textual parts on the left. It includes, for instance, the fact that certain words in the text represent personal and place names. We already saw an example in figure 5.4, **persName**. Each line in the upper right window in figure 5.5 represents an entity which can be included in triples as domain or range. Some of the information in the upper right window, such as the fact that Lasse Jensen Femund is the speaker of the paragraph and that Røvola is used as a place name in this paragraph, was taken from the TEI document.

The lower right window shows information which goes beyond the TEI model. It is used to enter full triples stating, for instance, that Røen-Elfv runs into FemundSøen. One of the reasons for breaking free from the linear structure and the tree structure lies here. Even if pieces of information about the same objects tend to be located close to each other in the text, the domain and range of such triples can also be at significant distances from each other in the text. One example of the latter is co-reference information, which will be discussed below.

The modelling system in GeoModelText is based on a principle of accumulation. First, it stores the printed version of the text in the form of a digital replica. Second, it also includes hierarchical information and some meta-data fetched from the TEI document, and third, it includes triples entered manually by me as a user. As I had it in my power to develop GeoModelText further while I was doing the modelling work, I could make new subsystems for any of the three perspectives of the data and also for any combination of them. Once a set of triples was added, I could study them and create additional tools to examine and manipulate the statements.

When I claim that my system goes beyond the TEI document, I am not implying that it leaves the TEI document behind. The TEI document with all the information about the XML context-free structure is there in GeoModelText. The linearity taken from the text printed in the book is also there. But in addition, I have tools to add other structures—structures which go beyond what can practically be handled in a text or XML-based system.[27]

5.3 Building the primary model

Modelling affects my research in the most profound way. We have already seen some elements of how the primary model is developed, including modelling not only in the sense of trying out and altering a mechanism as I went along, but also discovering which mechanisms are needed.

A prerequisite for the experiments was a thorough close reading of the parts of **S1** used in the case studies. All the geographic information I was able to read out of the text was included as connected facts in GeoModelText. This was needed in order to fully detect the expressiveness of the text in the area of geographical information. It was important to include all the geographical information readable from the text. If I omit information, then the map may not represent the text, even if it represents the model.[28] Automatic algorith-

[27]Another question is what happens after the project. All my results can be re-exported in a linear form into an extended TEI document. But this is for storage of already created data, not for developing the dataset in the first place.

[28]This is based on a division between geographical and non-geographical, with is not straight forward. It will be discussed further below.

mic tools could not be relied on; a human reader was necessary in order to understand all that the text is able to convey, and to understand it in a precise way. I used repeated rereadings of the text with the model in hand in order to make sure that everything was included.

The primary model was created in a semi-automatic way, using two distinct techniques. First, a digital representation of information extracted automatically from the TEI version of Schnitler's text was created, and second, I added information by manually entering statements into the model, using the tools in GeoModelText. This was outlined in connection to figure 5.5 above and will be described further here.

In the main modelling window, the user is presented with one paragraph at a time on the left side of the window. The user can step from paragraph to paragraph, jump to a specific paragraph, and also turn the XML tags on and off in the text window. On the right-hand side, there are two tables. The one on top represents entities mentioned in the text, such as places, persons, dates, and events. The bottom table is used for properties linking the entities together.[29] Properties can, for instance, be geographical relations, such as part of, directions, or distances, or they can be the role a person has in an event, such as being the priest at a baptism.

I model statements as they are expressed in the text written by Schnitler. I do not model what I believe to be true on the ground, but rather the possible world expressed by Schnitler in the text, based on my interpretation of the same text.

In modelling, one must decide what contextual information and associations to regard as relevant to the model. The sentences and paragraphs of the original text represented a context surrounding each of the expressions I modelled. Further, the reader of the text will have contextual knowledge. Some of this context is used in the creation of the model, but less than what would be used in an ordinary reading of the text. Removal of contextual information, or rather the decision not to see it, is an important part of the modelling process. Excluding all context is impossible, but I limit the contextual information I use

[29]The expressions "entity" and "property" are taken from CIDOC-CRM.

quite drastically.[30] My method accepts the fact that potential contexts exist that I cannot see, but in addition, I have decided to pretend not to see even what I can see, even if it is clearly relevant for understanding the text, such as a general understanding of the landscape of Northern Scandinavia.[31] The experiments taken as a whole will show how far I was able to get using this approach.

Some external sources are used in the reading on which the modelling is based, including an index from the 1962 edition in which place names are disambiguated. This index is used to find out when two strings in the text, two usages of place names, are intended to refer to the same physical place—that is, when they co-refer. No knowledge from other sources as to the spatiality of places and relations between them, such as their relative locations, their size and form, is included from context; it is included in the model only as far as it is stated in the source text. This forces the model to include information from the text only in this specific area.

Co-reference is closely connected to context and turned out to be problematic in the modelling. The same can be said about time. They will both be explained in some detail in the following, before I come back to the primary model as such and clarify what it actually is.

5.3.1 Co-reference

When two or more textual expressions refer to the same object external to the text, we call it "co-reference".[32] Co-reference is a fundamental feature of

[30]In all reading of text the potential context is unlimited, it can include "just about anything in the circumstances of the utterance, and just about anything in the participants' knowledge or prior or current expertise" (Hirst, 2000, 279). However, even if it is true that the potential for context is unlimited, the context available for a reasonable reading of a specific text is still quite limited. A work such as **S1** is situated by the genre and self definition of the edition, expressed by the paratext, in a way which effectively exclude many potential contexts as irrelevant. So does the manuscript on which it was based.

[31]The strength of unknowing, decontextualised computers is similar to the problems of situatedness and embodiment in artificial intelligence research, as discussed by Pfeifer and Scheier (1999, 71–73), seen from the other side. What are problems in artificial intelligence are assets for my work (McGann, 2001, 190–191). In digital humanities we exploit the fact that computers are less goal oriented than we are, less framed in sympathetic exchanges with desire for meaning, so they can help us to find other readings than the ones we see.

[32]For more information about co-reference and further references, see Eide (2009).

language. A simple example is the fact that "Peter Schnitler" written on the title page of **S1** refers to the same deceased person as does "Peter Schnitler" written in this thesis. In order to link together statements about real-world objects found in **S1**, information about co-reference had to be stored. However, co-reference also turned out to be one of the areas in which context became difficult. I will here briefly introduce co-reference, before I explain why it caused problems for my work.

Co-reference occurs when texts refer to a world external to documents.[33] A co-reference is a relationship that exists between two strings of text or other expressions, A and B, by virtue of the fact that both A and B refer to the same real-world object Φ. To record a co-reference is to make a statement that A and B both refer to Φ. If such a recording is made in the form of an explicit link, we have a co-reference link in the information system in which it is stored. The statement can be made even if A and B do not co-refer in reality, in which case it is a false co-reference claim. The truth values of some co-reference statements may be uncertain or contested.

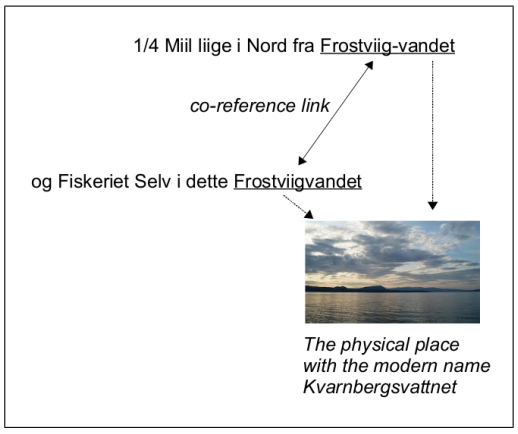
In order for the model to represent a reading of **S1**, the fact that co-references exist in the text has to be taken into consideration. Co-references are stored in GeoModelText as links between expressions referring to the same real-world object; in this project, all such expressions are strings. Co-referring strings can be names, but they can also be other strings referring to one specific real-world object (e.g., "the lake"). Co-reference links are transitive; sentence 5.7 is always true. Through this fact, larger groups of co-referring strings are built up.

$$\text{coref}(A, B) \wedge \text{coref}(B, C) \Rightarrow \text{coref}(A, C) \tag{5.7}$$

An example of co-reference is shown in figure 5.6.[34] An information system

[33]Co-reference also cross over media borders. A dot on a map, an image, and a word in a text can all co-refer to the physical place we commonly use 'Røros' to refer to. Here, co-reference will be discussed in the context of the source text. In part III, a more general discussion of the referentiality of maps and texts will follow, taking semiotics into consideration.

[34]In historical sources, one can use such co-references, internal to one source as well as



Frostviigvandet and *Frostviigvandet* in the text fragments both refer to the physical lake. The contexts of both sentences show that they refer to that specific lake, and not another lake with the same name. The co-reference link is added between the two names in the two text fragments (Eide, 2009).

Figure 5.6: What co-reference is.

for co-reference handling, such as the one implemented in GeoModelText, will add links between different strings. To do this, an identity relation has to be used between the things the expressions refer to; a clear concept of sameness is needed in order to investigate whether two strings co-refer. It is a necessary condition for co-reference that things stay the same as themselves over time. A concept of sameness can be expressed in an identity definition. In this project, co-reference is mainly used for historical persons and places, which are the types of things for which I will indicate what such an identity definition may be.

A possible identity definition for historical persons is outlined in Eide (2009). It is based on the fact that a person can be seen as the living entity filling a specific location in space at any time during his or her existence.[35] This is sufficient for the current work. For persons there were few problems in this project, only a limited number of ambiguous names. Co-reference for persons

between different sources, to link together a set of references to a co-reference chain (Asdal et al., 2008, 91–92). Such chains can be recorded in an information system. Each referring string can then be a part of a distributed network of co-reference sets which can be implemented within one system as well as between different systems operated by different cultural heritage institutions. This is fundamental for the achievement of information integration across resources, as an addition to the use of common schema and formal ontologies (Meghini et al., 2009).

[35]It is worth noting that such an identity definition for persons will not work for fictitious persons, but as all important persons discussed in **S1** are claimed to be historical persons, this is not a problem in the current work.

can be hard to establish because of lack of knowledge, but never because of fuzzy boundaries.[36]

The identity definition for places is more complex. According to Gibson, the surface layout of places comprises attached objects, as opposed to persons, who are detached objects and can move around. "Places can be named, but they need not have sharp boundaries" (Gibson, 1986, 34).[37]

The traditional methods for co-reference resolution for places include using maps and gazetteers. Using a map gives access to a more complex set of relationships than a mere co-reference. By connecting each place to a geometrical feature, such as a point, a line, or a polygon, different places can be combined geometrically with each other. Each map can be integrated with any other map covering the same area, as long as they both use well-defined coordinate systems. Co-reference then becomes a geometrical operation. It will have to be seen in light of a number of other types of possible relations, such as overlap, coverage, and disconnectedness.[38]

But there is more to it than spatial relationships. One set of texts may discuss a municipality with the name Åsnes, and another set of texts may discuss a parish with the same name, Åsnes. The area of the municipality and of the parish may be identical at a specific time. Still, it would be wrong to say the two sets of texts are discussing the same entity. Further, if one text discusses the medieval town of Nidaros and another text discusses the modern city of Trondheim, the two place names may be said to co-refer, even if the names are different and the areas covered by these two entities are different, since the medieval town covers only a part of the area of the modern city. What links them together is the fact that they are in some way seen as the same social, religious, and political entity. So co-reference can be based on social criteria as well as spatial relationships.[39] One example from **S1** is the following, in which a place name refers to both a farm and a church: "Its Church is called

[36]The co-references for persons were established in an earlier project (Eide, 2004).

[37]This is in line with the difference between openness and closeness in mereotopology (Mark et al., 1999, 286–287). While persons are closed, that is, they have natural physical border, many places are open.

[38]A number of such relations are defined in mereotopology, as described by Smith (1996).

[39]This is linked to the distinction between space and place, of which a recent good discussion in the light of gazetteers can be found in Southall et al. (2011).

FolderEid from the farm on which it stands."[40]

I am not able to specify a clear identity definition for places which would work for **S1**. A place is a social construction, and places referred to by strings of text are never trivial to identify. Co-referring will inevitably fix the meaning of a place reference in certain ways, removing some of the flexibility in verbal text.[41]

Even if no general solution to the identity problem is found, it is quite clear that co-references were used by the witnesses and by Schnitler. They would know if they meant to refer to the same place in different statements. The solution I chose was to make pragmatic attempts to understand the intended meanings of textual expressions. If it was clear that Schnitler and the other voices in the text meant the same place when they used two expressions, the strings were said to co-refer and the co-reference link was recorded in GeoModelText. When I was in doubt, the expressions were left disconnected.

To clarify what this pragmatism implies, the practice of entering co-reference links will be demonstrated through some examples. One case where I did not add any co-reference links was that of the following three places:

1. "Harrans Annex Church" ("*Harrans Annex* Kiercke" (**S1**, 150))
2. "Harrans Church-Parish" ("*Harrans*- . . . Kiercke-Sogner" (**S1**, 162))
3. "The rural district of Harran" ("*Harrans* bøid" (**S1**, 163))

Place 1 is clearly located within places 2 and 3, and there is a relationship between 2 and 3, but these are not the kinds of connections between place names that I express in the co-reference system. While entering a co-reference is necessarily a process of including contextual information into the model, the level of context to be included must be held under strict control. Co-references are based on identity relations only, not on relations such as 'related' or 'part of'. The latter types of relations are included in the model only when they are expressed explicitly in **S1**.

[40] "Dends Kiercke kaldes *Folder*Eid af den gaard hun Staar paa" (**S1**, 149).

[41] Place name flexibility is also present in maps: one can connect a name on the map to a point, line or polygon, but it can also be connected to a general area without borders, e.g., when naming mountains.

An example of a case where I did enter a co-reference link is that between the following place names:

1. "*Betzeko-jaure*" (**S1**, 297)

2. "*Betzeko*-Vand" (**S1**, 318)

The co-reference is based on the fact that both place names contain words with a meaning similar to that of the English word "lake": *jaure* (smi) = *vand* (dan). In order to assist the creation of co-references, I included knowledge about appellatives in different languages, mostly Sami and Norwegian, when they could be identified in the spelling used, as this is part of reading and understanding **S1**.[42]

The history behind the digital text must always be taken into consideration when it is used in research. This is shown clearly by the TEI version of **S1**. In some cases, the place name tagging led to inconsistent results in regard to how much was included as part of the string making up a place name because the text is inconsistent as to whether expressions are written as one or several words. In such cases, the difference between the digital version of the text, the printed text, and the manuscript becomes relevant, and some co-reference problems were introduced.

The fact that the printed text is a transcript of a manuscript, as well as the underlying orality of the text, should have been taken more seriously in the original tagging of the text. Divisions between words were allowed to play too important a role when the original markup of the places names was established. Word divisions are often dubious in a manuscript, and the act of connecting them to the oral statements is speculative at best. One example is the head of the fjord Leerpollen being expressed in two different ways in **S1** (298):

1. "*Leerpolls* Botten", tagged: `<placeName>Leerpolls</placeName> Botten`

2. "*Leerpolls*Botten", tagged: `<placeName>LeerpollsBotten</placeName>`[43]

[42]This is a border case, also because we do not know if **S1** or specific witnesses saw these relationships. However, the interpreter, mastering both languages, would clearly have seen them.

[43]To simplify the examples, the italics are excluded from the tagging.

The reason for the different tagging is that the place name tagging was seeking to identify a place name, excluding any closer specification of the place within the area referred to by the name. This is not doable in practice, as this example highlights, because there are few systematic rules in the spelling, and divisions between words are notoriously hard to identify in manuscripts, so they are expressed inconsistently in the printed text. However, when I became aware of it, I was able to cope with the problems introduced by this less than ideal practice by adjusting how text was shown in the tool used for co-reference resolution in GeoModelText.

The examples from co-reference practice illustrate the trade-off between lack of information and false positives. I have kept on the conservative side for both time spent and lack of certainty. I held back if too much time was needed to investigate a potential co-reference, and I held back on entering doubtful co-references, even in cases like the Harran example above where the place names obviously are connected but where they refer to different aspects of the same place.

Through a semi-automatic process based on information from the place name registry, co-reference information was recorded for places throughout **S1**. As a result, 86% of the almost 18,000 encoded references to places have one or more co-references recorded.[44] Because of the conservative nature of the work, there are few false positives and an unknown number of co-references which were not recorded, so presumably the real level of co-reference in **S1** is higher.

5.3.2 Time and events

The modelling of space also had to take time into consideration.[45] Events are clearly linked to the places at which they occurred. Most references to time included in the model are connected to events.[46] The concept of 'event' is used

[44]Details of how this was done can be found in the data package. Through adding this information, chains of co-references were established. If we look beyond this PhD project, these co-reference networks will be open for future connections to external resources as well, in line with the suggestions from Meghini et al. (2009).

[45]Based on Gibson's argument as we saw it in part I, time and space should rather be seen as events and environment, respectively.

[46]Dates were encoded as such in the TEI version of the text, but they are more useful when they are connected to persons and places through events.

in line with **E5 Event** in CIDOC-CRM, that is:

> changes of states in cultural, social or physical systems, regardless of scale, brought about by a series or group of coherent physical, cultural, technological or legal phenomena (CIDOC, 2011, 4).[47]

This is in line with how the concept is used in Gibson (1986, 242). The reality described in **S1** includes instantaneous events as well as ongoing processes—baptising children as well as bringing them up. But stable states are usually more difficult to observe than events:

> [S]tates are difficult to observe. That a property was valid over an interval of time and neither before nor after needs continuous complete observation. One can more easily observe a status, that is, the validity of some properties at a point in time, or a transition event (Doerr, 2003, 83).

The distinction between instantaneous events and ongoing processes is dependent on perspective. In a family history, a wedding will usually be seen as instantaneous. When a day in the life of a priest is described, on the other hand, one wedding may very well be seen as an ongoing process. In the latter case, what is documented is often the start and end of the ceremony, as well as some highlights during it. Using the terms from Doerr above, what we most often have recorded in historical sources are statuses and transition events.

Historical knowledge can still tell us something about ongoing processes. Each court session is one process. In order to avoid unnecessary and hard-to-find distinctions which are based on the perspective of the observer, I combined all processes and events within the type 'event'. When modelling events such as court interviews, one does not know more than the text tells one. It may be the case that all the people mentioned as participants in the event were present throughout the event, or it may be that some of them came and went. In the current project, little is lost by not knowing such things.

[47]Many of the events we see in **S1** could have been represented by subtypes of **E5 Event** in the CIDOC-CRM, such as **E7 Activity** or **E67 Birth**. Such sub-typing is not formalised in this project.

Events and processes are not distinguished in the modelling, but there is another distinction of significant consequence for the modelling. The events we find textually described in **S1** operate at two levels, leading to quite different modelling strategies:

1. Each interview is an event, forming a legally significant part of a court session. This event has the time, place and many of the participants recorded in **S1**. A statement in **S1** is the written record of the interview event. Each paragraph in the testimony-based text includes one answer or a part of one answer. The uttering of an answer is a sub-event under the interview. These events and sub-events are idealised in the written record, as we saw in chapter 4; still, legal circumstances make it quite clear that they did take place, and did so in a formalised way.

2. The records of the interviews may contain references to events. One example is a dated legal document presented in court, implying a legal event of document creation. Other examples include eucharists, births, and weddings. A string referring to such an event is recorded as an entity with type **rs: event**[48] in the model. Co-references among these references to events are also included in the model, as appropriate.[49]

The conditions for truth are different in these two cases, based on their different contextual placement. While Schnitler is responsible not only to the King but also to God for the truthful record of type 1 events,[50] events of type 2 are the responsibility of the witnesses alone. Even if Schnitler presumably would not record anything he knew was wrong even if it was stated by a witness, at least not without commenting on it, he was, strictly speaking, entitled to do so if he felt it appropriate.[51]

[48] 'rs' stands for referring string, so the expression 'rs: event' stands for a string referring to an event.

[49] The identity definition for events is difficult along similar lines as for places. However, it is less important in this project and will not be expanded upon.

[50] He is responsible to God because of the oath, which is a legal-religious construction.

[51] This is in line with a speaker's responsibility for so-called 'that-sentences', or of the truth value of exhibited facts, in analytical philosophy. For a discussion of modelling of such constructs, see Eide (2008).

As we will see later, these event types are modelled differently, and that leads to different mapmaking strategies as well. Type 1 events are best represented by specific maps expressing what is said in each interview, whereas type 2 events are better represented by symbols on a map.[52]

However, there is another type of event-like happening which I call *recurring events*. Examples include the habit of fishing in a specific area or the habit of millstone cutting, and usually the text refers to a group of people said to take part in such activities at a specific place. These recurring events are seen as types.[53] The examples of fishing and millstone cutting would then be types of land use, connected to land use rights and possible violations of them. Land use rights often overlap in areas such as northern Scandinavia.[54]

Places and events are closely connected, but the perspective decides how the connection plays out.[55] Seen from the perspective of the event, the place is what connects it to the landscape. Seen from the perspective of the place, which is the map perspective, an event is a feature of a place. In this latter perspective, events are part of the past of a place, of its history. However, while a place in itself has a natural location on a topographical map, a place's history of events is more in the nature of thematic mapping. The same is true of type events; they describe a feature of a landscape rather than the landscape itself.

[52]In the mapmaking of this project, that is. In other situations a different scale and perspective will lead to other mapping strategies being more appropriate. One example would be a thematic map presenting all witnesses, where each event of type 1 would best be expressed as a symbol on the map.

[53]Recurring events make claims about the future. Future events have different ontological statuses from historical events. They are similar to plans in the way that they may never take place. Future events can best be discussed at a categorical level, that is, as types. My solution is inspired by how this is done in FRBRoo, a CIDOC-CRM compliant version of FRBR, where categorical levels are expressed using subclasses of **E55 Type** (FRBR, 2012, 102–103).

[54]This is common in first nation areas in North America as well. In his discussion of first nations' land claims in Canada, Usher (2003) made it clear that land use must be seen as different from occupancy, and also different from areas of regular travel, to avoid a mess of overlapping claims.

[55]For a philosophical discussion of the differences between events and objects, see Casati and Varzi (2010, sec. 1.1).

5.3.3 What the primary model looks like

So, what exactly is the primary model? It is a state in GeoModelText, based on data stored in various files. These files are partly populated by entering data into GeoModelText. Other parts of the primary model are fetched from the pre-existing TEI files. All the files are loaded automatically when the programme is run.

The state in GeoModelText which is the primary model consists of all the place and personal names in **S1**, as well as a number of other strings referring to persons, places, and events. It also contains information about co-references between specific personal names and other references to persons, as well as between specific place names and other references to places, and the same for events. Through the sets of co-references it includes objects representing the historical persons, places, and events mentioned in the text.

Finally, the primary model contains other typed relations between persons, places and events, many of them cross-categorical—for example, a relation between a person and a birth event with the type "was born", or a relation between the birth event and a place with the type "took place at". These two relations may represent a reading of a sentence of the type "He was born at the place ..." All such relationships are based on my reading of the text and are kept close to the form in which they were expressed in **S1**.

Some of the information is recorded for the whole of **S1**, including place and personal names and co-reference relationships between them. Other types of information are added only to the parts of **S1** used intensively in experiments. In chapter 6, examples of the creation and use of the primary model will be shown, making it clearer how it works at the practical level.

5.4 Towards the formal model

Recall how the modelling process was divided into five stages: *text, primary model, formalised model, vector data,* and *map*. Why is the formalised model a natural milestone in the process? It is created after all the recalculations and choices needed in order to make numerical expressions based on the directions,

distances, sizes, and so on found in the source text are done. The stage is just before the translation into vector numbers starts, so it is a natural milestone between two types of processes.

The process from the primary model to the formalised model included different types of individual steps, which will be described in this section. The starting point for the stepwise formalisation was the primary model. I am responsible for the whole process of stepwise formalisation, but the responsibility is expressed in two different ways. In parts of the process I enter information into the system manually, although supported by the system; in other parts the information is created by algorithms based on parameters.

Contents ▲	Parsed contents
3/4 |Fierding miil] vejs	<spaceDistanceMileUnknown>0.1875</spaceDistanceMileUnknown>
3/4 vejs Maalte Miile	<spaceDistanceMileNew>0.75</spaceDistanceMileNew>
3/8:- miil	<spaceDistanceMileUnknown>0.375</spaceDistanceMileUnknown>
3 dags Reisse	<spaceDistanceDayTravel>3</spaceDistanceDayTravel>
3 maalte miile	<spaceDistanceMileNew>3</spaceDistanceMileNew>
3 maalte Miile	<spaceDistanceMileNew>3</spaceDistanceMileNew>
3 Miil	<spaceDistanceMileUnknown>3</spaceDistanceMileUnknown>
4 1/2 miil	<spaceDistanceMileUnknown>4.5</spaceDistanceMileUnknown>

Figure 5.7: Fragment of the added nodes window of GeoModelText showing an example of computer-assisted manual stepwise formalisation.

Some examples of the former procedure can be seen in figure 5.7, where we see a window which is used to enter formalised statements under the heading "Parsed contents" based on a sorted list of primary model statements under the heading "Contents". In the first line, the length expression used is "Fierding miil", which is a quarter mile. (What type of mile is not stated.) So, what we have is $\frac{1}{4} \cdot \frac{3}{4} = \frac{3}{16}$, that is, 0.1875 miles of an unknown type, hence the expression in the column to the right. The statements in the other lines are made in similar ways, noting that "Maalte Miile" in lines 2, 5, and 6 are taken to mean modern, measured miles, and that in line 4, a day's travel ("dags Reisse") is read as an expression of distance.

Other parts are written as software algorithms in GeoModelText. When I run an experiment and start a computer job producing a set of output maps, the program begins with creating a formalised model using as an input the primary

model, strengthened by manual formalisations like the ones just described. For example, it begins with 1.25 miles of unknown type and "decides" that this is, say, 10 kilometres, and all occurrences of the direction "east" are re-calculated to 80°, 90°, 100°, or another number of degrees entered as a parameter value. These choices are also under my control, as the software making the recalculation was written by me, and the parameter values used to recalculate "unknown mile" and "east" were set by me.

So the difference between the two ways in which the formal model is created is not who is responsible, but rather how each decision is implemented. In the latter case, an algorithm exists in written form as part of the computer program. In the former case, what is done is also documented (e.g., in the two columns "Contents" and "Parsed contents" in figure 5.7), but each case is considered individually. I also followed strict rules in the former case; algorithms may also be run by humans, but in this case the rules do not have to be followed. I can break the rules; my computer cannot. Another difference is that the values set as parameters for an algorithm can more easily be changed en bloc over many occurrences in order to test different interpretations. Thus, I mainly use this method for open choices where different values must be tried.

What exactly are the choices which had to be made, and how were they handled in the stepwise formalisation process? The process included finding values for spatial relations. There is no single correct interpretation of "east" or of "$\frac{1}{4}$ mile" to be found. It is even doubtful if accurate interpretations were available to the persons making the original statements. I had to make choices for such values for a number of expressions in the source text. I put together some types of choices in table 5.3, with two different examples of possible values for each of them. GeoModelText is designed to allow me to change the way these expressions are normalised—that is, changing the values for each of the parameters between **Ex. 1** and **Ex. 2** as well as to any other value.

Some care must be taken when the expressions are interpreted, in order to prevent contextual information (e.g., from maps) from sneaking into the interpretations. As the values were chosen to be similar for all occurrences of one measurement type, this turned out to be an easy problem to solve. It is, however, the case that some external information was needed to interpret one

Measurement name	**Length (km)**		**Explanation**
	Ex. 1	**Ex. 2**	
MILE_UNKNOWN	8	7	Mile, type not specified
MILE_OLD	8	6	Old mile
MILE_MOUNTAIN	6	5	Mountain mile
MILE_VILLAGE	8	7	Village mile
MILE_NEW	11.3	11	New (official) mile
CLOSE	0.1	0.05	Something is said to be close
TOUCH	0	0	Something is said to be touching or this is implied, e.g. in a river mouth the river touches the lake
DEFAULT_POLYGON_SIZE	4*6	1*0.5	Default size of a polygon map object

Table 5.3: Some measurements for lengths and areas and two examples of possible values for normalisation for each of them. Note that the measurements have more or less fixed values, leading to more or less room for variation.

type of mile, namely the so-called modern,[56] measured mile, which is found by historians to be close to 11.3 kilometres (Nørlund 1944, 77; Brøgger 1982, 59). To know this is part of understanding the language, and it was clearly known to Schnitler.

However, knowing this is not enough to state that the text means exactly 11.3 kilometres by any specific use of the words "moderne miil". Both lack of accuracy in measurements and rounding off come in here; no number with a level of accuracy higher than $\frac{1}{16}$ is used. For other types of miles than the "modern" one, even such an agreed ideal is not available. Schnitler showed that the different types of miles had no obvious interpretation but rather had to be explained, as when he described relations between some of them:

> 11 old miles from the border mark Svanesteenen; about which the court is of the opinion that one of them could be as long as half a measured village mile.[57]

[56]Modern, that is, from the perspective of the 1740's—we would rather call it contemporary.

[57]"11^{ve} gamle Miile fra Grændse-Mærcket *Svanesteenen*; Hvor om Laugrettet meener at En af dem kan være Saa lang, Som En halv Maalt bøjde Miil" (**S1**, 141).

A system similar to the one shown in table 5.3 is also used for directions. The partly normalised directional expressions were taken from the system of 16 directions, as we saw above. Each expression is given a normalised decimal number value in the 360° system. These values can also be changed, as long as they stay within a reasonable span. Any other direction than the 16 mentioned, e.g., 'above', will not result in any formalised direction at all being entered. This means that any direction that is not normalised or normalisable in this system will fall off. Such other directions are rare, though; they are not found in the case studies.

The spatial relationships **between** and **part of** are also included in the model. They cannot be replaced by numerical values without taking other places into consideration. **Between** is used to locate two places something is between on opposite sides of it, and **part of** is used to put a place within the area of another place. All places that have other places as parts of their areas must be represented as polygons on the maps.

5.5 Vector data

Vector data consist of numbers representing places in a geometrical space, together with textual information about the places. They are used in various areas (e.g., in computer graphics), but in the context of this thesis, only their use as geographical data is considered. Each geographical object consists of a geometrical primitive such as a point, a line, or a polygon,[58] as well as its location in a geographical space. However, when we look at the text of **S1**, we see something quite different from vector data: there are no obvious links between the two types of information.

Two examples of how different they are can be seen in the expressions "øster" (east) and "2 miile" (2 miles) from the source text. These two expressions are found in the source text and they are geographical, so pieces of information found through the reading of these two strings are included in the model, but the strings have no meaning in a context of vector data. The stepwise formalisation process is used to make meaningful vector data based on such

[58]Other and more complex types also exist, but are not used in this project.

text strings. We have already seen the first stages of the process, and have now come to the re-coding of data from the formal model to vector data.

This is not straightforward. In order to understand how the locations of places mentioned in **S1** can be expressed as vector data, we need to understand the distinction between absolute and relative locations in cartography. An absolute location is a location specified in a coordinate system. A relative location is a location expressed through a textual expression such as "two miles down the river from Røros".[59]

We have access only to place names and relative locations in **S1**; there are no absolute locations. When two places are spatially related by expressions such as "øster" and "2 miil", we know something about their relative locations, but we know nothing about the absolute location of either of them. If we have a set of spatially related places in the model, we need several steps to convert this to the vector data needed to make a map, including giving one of the places an arbitrary coordinate. A natural choice is to give one place the coordinate $(0, 0)$. Once that is done, the others can be given coordinates based on the relationships between them. In other words, we have a set of interrelated places floating at an undefined location in space. The only way to fix it is to give one of the places coordinates by an arbitrary choice. Further examples of how this is done will follow in the case studies in chapter 6.

Finding spatial relationships between places includes the use of co-reference information. This means that any differences between two place names outside of their referring to different real-world places fall off at this stage. Could such differences exist? Could there be spatially meaningful differences between different place names referring to the same place? According to the discussion in section 3.4.3, there could be such differences, since at least some of the place names are also descriptions of the places; thus, as the place names not only denote places but also connote other meanings, these meanings could potentially lead to different spatial interpretations of some of the place names found in the text. For example, if the name of a lake included a description

[59]The wording is somewhat peculiar because a value in a coordinate system is actually used to specify a place relative to a fix point. In the case of longitude-latitude the fix point is the crossing between Equator and the Greenwich meridian. Still, this is the way these geographical expressions are used.

claiming that the lake is quite round in outline, this description would then restrict the way the lake could be drawn.

However, such possibilities are only speculative. I have found no spatially meaningful differences between different expressions referring to the same place in this project. Although places may have names indicating form, I have not found place names for which it is clearly the case that such an indication actually can be taken as steering how the place may look. One might ask whether my methods would be good ways to find them, but a more thorough search for such differences is beyond the scope of this project. Further, it would not raise the specificity of the text nearly enough to remove underspecification altogether. Therefore, I will not discuss the matter further.[60]

This closes this short section on vector data. However, vector data are closely connected to maps, so they will be discussed further in what follows.

5.6 Maps

The maps produced in the experiments follow the definition from page 31. But they are a special type of map, not only because they are digital maps made by Geographical Information System (GIS) software, but also because they are maps made from one source only, my reading of **S1** as it is processed through the series of stages we have just gone through.

As there are no references to absolute locations in **S1**, all places are either referred to by the use of names, through other strings referring to places, or through relative expressions. Examples of how these three ways are used to refer to places can all be found in the following citation:

> Their newly settled farms are located, as is the farm Qvælien, easternmost in Northern Finlje, 11 old miles from the border mark Svanesteenen;[61]

[60] Another potential use of connotational differences may be that they make it more or less likely to find the right location of a place related to other places. So even in cases where it does not change the reference function of the place name, it may change our ability to follow the reference. This is not studied in this thesis either.

[61] "Deris Nyebyggerplatzer ligge, ligesom gaarden *Qvælien* østerst i denne bøjd Nordre *Finlje* 11^{ve} gamle Miile fra Grændse-Mærcket *Svanesteenen*" (**S1**, 141).

The place identifiers used in the citation are the following:

place names Qvælien, Northern Finlje, Svanesteenen

other referring string Their newly settled farms

relative expressions easternmost in Northern Finlje, 11 old Miles from the border mark Svanesteenen[62]

The lack of absolute locations means that no reference to a place can be located in relation to any other place reference on the map unless there is an explicit relationship between them in the model, either direct or indirect. They cannot be part of the same map without such a relationship.

When the two places are included on a map, the relationship between them becomes implicit, expressing a spatial relationship. In a text, such expressions must be explicit. When no such explicit relationship, direct or indirect, exists in the text fragment on which the model is to be based, the only way to enter such a relationship into the model, and thus onto the map, would be by guessing.

I have chosen not to make such guesses in the totally unlimited case—that is, when I have no indication at all of the spatial relationship between places, apart from the fact that both are in a general area such as a county. Then the two places must be made parts of two different maps. The number of maps to whose creation a text fragment leads is an important indication of how the spatial information is expressed in the text, because it clarifies how many of the places are directly or indirectly spatially connected.

From the criteria for including places on the same map, we can note two things. First, the properties are the keys to the experiment, as they link the entities in the model together. Second, any information that exists in isolation, not connected to other parts of the model, falls off. This means that places for which no relation to any other place is expressed fall off. Further, without any

[62]These two expressions can be seen as two overlapping areas, of which the intersection is the area referred to. Alternatively, they can be seen as forming one area as a whole. The result may be the same when the expression is read by a knowledgeable human, but differences in the modelling process could possibly lead to different results in the experiment. Because of these differences, the interpretation which is not chosen will fall off.

properties connecting two places in the model, directly or indirectly, they must be put on two different maps.

But something else happens here as well. Once the map is produced, the explicit textual relationships between the places are lost. Each place is located according to its coordinates, and it is related to all other places on the same map as a consequence of the coordinates used in placing them. Instead of explicit relationships between named places, implicit spatial relationships between map objects are included. What was "east" is now an accurate direction which can be measured to, e.g., 96.5°. This direction is indifferent as to whether the specific relationship was mentioned in the text or can only be indirectly deduced. This important point will be revisited later.

The main geometrical specifications of the maps were already made in the vector file. Seen in that perspective, what is added in the map production is only the layout (e.g., the colour and form) of the symbols. Still, the difference is felt more intensely by a user. Seeing a vector data file on the one hand and a map on the other are two quite different experiences for a human observer.

In order to clarify some of the implications of the making of maps in this project, GIS and geographical ontologies must be mentioned. GIS stands for *Geographical Information Systems*. The expression is used only to refer to computer-based systems, although the name in itself also could have referred to non-digital systems. Many GIS tools exist. In this project I have mainly used the free software application *Quantum GIS*.[63] Although digital maps are images, their production is based on and steered by a set of numbers, which are the vector data we saw above.[64] The map is seen as a two-dimensional coordinate system with X and Y axes. A point is represented by two numbers, whereas a rectangle can be represented by eight numbers—that is, two for each of the corner points.[65] An example can be found in figure 5.8. Such sets of numbers are what make up vector data.

GIS grew out of a cartographical tradition which aimed at map production.

[63]qGIS, webpage: http://www.qgis.org/ (checked 2012-01-25). In the experiments, I tried various methods to summarise and visualise the models; some examples are described in chapter 6. The most important tool turned out to be the qGIS software package.

[64]There are other sources for digital maps not discussed here, e.g., raster data.

[65]There are other ways to represent rectangles as well.

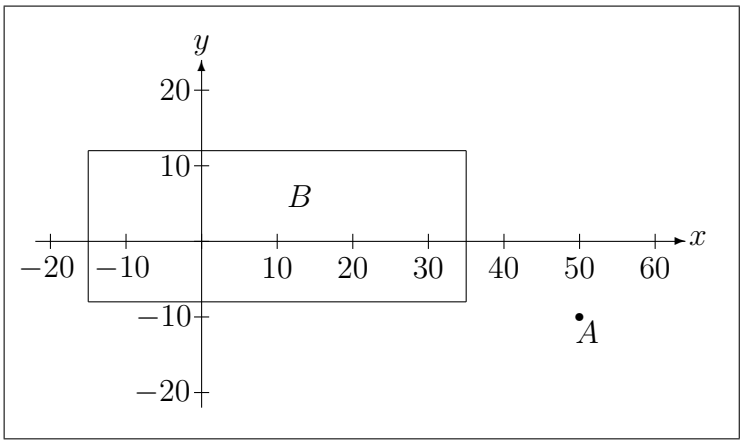


Figure 5.8: Vector data example with point $A = (50, -10)$ and rectangle $B = ((-15, -8), (35, -8), (35, 12), (-15, 12))$.

This is still visible today.[66] My use of the tools is quite simple, and I had no problem doing what I wanted, which was to use GIS to display maps. That is, I read vector data into qGIS and define symbols and other features of the map layout in order to produce informative maps. Maps in qGIS are used interactively and are exported as static map documents to be printed in this thesis.

Some sort of GIS software is needed to make a map from vector data.[67] Based on the software, as well as on parameters entered by an operator, various maps can be made. The tool in itself is no guarantee that the resulting map will be useful or aesthetically pleasing. Creating good maps is a skill which takes much training, even with the best of tools (MacEachren, 2004). The maps I present in this thesis break fundamental rules for map design and do not look like visually conventional maps. That is intentional.

[66]There has been a movement in the direction of cognitive models of geographical space in the last 15 years. The geographical information theory behind this cognitive modelling has developed independently of GIS systems. A major difference between the traditional GIS based data standards and geographical ontologies has been that GIS based standards for geographical information have been developed to express and transfer data in professional geographical and cartographical environments, whereas geographical ontologies have taken the perspective of ordinary people (Mark et al., 1999).

[67]Strictly speaking, any software being able to visualise vector data can be used, including several web browsers. But in most cases GIS software will be needed in order for the user to experience useful interaction with the map.

The maps are based on sets of vector data which control where the elements are spatially located and how they look, but not fully. Many choices are made, affecting the visual appearance as well as details of the spatial relationships. The spatial relationships are established in the vector data, but not fully specified in detail by them. One example of this lack of full specificity is that symbols are routinely moved short distances in order to avoid floating into other symbols.

A map represents an interpretation of the data on which it is based, and errors can be introduced at many levels. In my use of GIS for visualisation, I am not interested in different interpretations of vector data by the GIS software; that is, I do not compare how different types of symbols give better or worse maps. I am only interested in different vector data coming out of my model. I focus on spatial differences (e.g., differences in distances and directions between places), rather than on presentational differences (e.g., in symbology).

Geographical ontologies as they are described in Smith (1996) and Galton (2005) go beyond the tradition of cartography. Simply speaking, the quantitative cartographical tradition is different from the qualitative view of geography used in ordinary human thinking and communication:

> In contrast to the ontologies underlying most geographic information systems, which rest on discretized metric world models, such an ontology must have the resources to represent the *qualitative* conceptual categories conveyed by natural language (Mark et al., 1999, 287; italics in original).

So the ideal of geographical ontologies is to cover geographical information expressed in verbal text as well as in maps—that is, to cover both sides of my comparison. This is also in line with Smith's hope for a generalisation from cognitive linguistics to general ontology, including not only conceptualisation and categorisation imposed via language use, but also based on, among other things, "the map-making activities of the geographer" (Smith, 1996, 299). An example is Galton's concept of 'neighbourhood', which has both field-like and object-like characteristics:

> The determinants of a neighbourhood include such things as house prices, average income, social class, ethnic identity, and accessibility, all of which can be modelled as fields. But they also include the presence or proximity of such things as shopping centres, canals, railways, recreation facilities, places of worship, etc., all of which are best modelled as objects (Galton, 2005, 49).

Above, I argued that political institutions connected to places such as municipalities have a similar double nature. A similar distinction, or lack thereof, was also to be found in relationship to events, especially type events. It is hard to make a distinction between discrete events and a seamless texture of continuous variation. This is discussed further by Grenon and Smith (2004). This also points towards the general problem of relationships between space and time, which will be important for the discussion in part III.

Ontologically based modelling of text is the method of my experiments. Because geographical ontologies are intended to cover both of the media I compare, they can function as bridges. The bridge metaphor is misleading in one respect, though. This process is not about crossing over from the text side to the map side with all the goods intact. The process will include losing as well as adding information. But modelling based on the thinking behind ontology development seems to be a good way to clarify what is lost and what is added. That is another reason why CIDOC-CRM is so useful in this work.

The algorithmic map production, consisting of computer-based as well as manual steps, is sufficient to find the results in the current project and to document my findings, as we will see in chapter 6. It works for small sets of data, typically the data included in the model of one paragraph of text. A system for automatic generation of vector data for larger models was not necessary for this project. It may be, however, that better mapping algorithms would have uncovered things I did not find in this project.

5.7 Results from the setup processes

The model and the tools used to create it were necessary to run the case studies described in the next chapter. During the setup of the modelling system, new

knowledge about the object of study was also gained, so that several results were found that will be of help in evaluating the hypothesis from page 14, as background for the results to be found in the next chapter.

In the following, I will summarise this chapter by presenting the three most important areas in which the development of the tool and the creation of the model led to better understanding of **S1** and of how I could experiment on its model. These results led to changes in my understanding of how the model represents the text and opened up new areas in which to seek answers to the research questions. Thus, it influenced how the scene was set for the case studies. They were interim results pointing towards the next stage of the research project, but also towards the main results. When the case studies were started, it was already quite clear that the hypothesis would be supported.

5.7.1 Directions

In **S1**, a system of at most 16 directions seems to be used: **north**, **north north east**, **north east**, etc. In order to formalise these directions, I started entering single numeric values for them. This was a rather naïve reading of the data; on second thought, it became clear that when something is east of something else it does not follow that it is in the exact direction of 90°. It is rather in a general eastern direction. On examining this more closely, I understood that each direction can best be seen as a sector in which possible locations can be found.

What would a word like "east" mean to Schnitler, or to the witnesses? Looking into the longer history of spatial expressions in Norway, we can see how Holtsmark (1961) describes the Nordic medieval system in which a direction includes the area around the angle.[68] Old Norse used a system of 8 directions. In line with this system, **north** can be taken to represent degrees $337\frac{1}{2}$ to $22\frac{1}{2}$,

[68]The only possible exception is expressions which are clearly specifying that the direction is in the middle, such as in: "in middle north" ("i miðiu ... norðri"), etc. (Holtsmark, 1961, c. 566). One may argue that even such statements express a sector, just a narrow one. It is indeed the case that even if the idea is to express a specific direction, it is not possible to do so because the system is not fine tuned enough. So it will be a sector of possible directions anyway. Be that as it may, expressions similar to "in middle north" are not found in **S1**. I take this as an indication that Schnitler consciously did not try to be specific about exact directions, that he was well aware that this was neither possible nor necessary.

north east $22\frac{1}{2}$ to $67\frac{1}{2}$, **east** $67\frac{1}{2}$ to $112\frac{1}{2}$, and so on. This system was still in use in Norway in the eighteenth century.[69] It can easily be doubled to a system of 16, which is still used by many people in Norway today.

In the Sami system, the word used for "north" also means "towards the sea" or "down the fjord"; see, e.g., "dâveb" (Nielsen and Nesheim, 1932, vol. I: 500). Similar double meanings are also included for the other cardinal directions. This sea-oriented directional system is presumed to be the traditional one. I have not been able to trace any usage of this system in the statements from Sami witnesses, and it is likely that the interpreters would change any expression based on it to the Norwegian system as part of the translation.

These historical considerations show that in principle, any specific direction within the sector is as good as any other when I choose a value for my formalised model. Any such direction will represent one possible reading of the text. If we have no other information, we cannot say that one reading is better than another. As a starting point, I used the middle value of the sector in all cases, knowing that I have a leeway based on at least 16 directions, that is, of at least $22\frac{1}{2}^\circ$.

So 90° is used for east, as originally planned, but this is now seen as an arbitrary choice, and it is changed in the case studies in order to show different interpretations of the text. Any value between $78\frac{3}{4}^\circ$ and $101\frac{1}{4}^\circ$ is equally likely to represent east, and any value between 0° and 180° is possible.[70] Other values would be considered wrong. Witnesses being wrong is also a possibility, of course, but in this project I model their statements, not what I consider to be true in the landscape.

[69] Personal communication from the lexicographer Oddrun Grønvik on October 25, 2010.

[70] Although 16 directions are used in some expressions in **S1**, with phrases such as east-north-east, we still do not know if not systems of 8, 4 and even 2 may be used in other situations. This is similar to the problem of precision in Ptolomy as discussed by Isaksen (2012). Examples of systems of 2 are found in Europe (Eastern vs. Western Europe), and also in Norway (Northern vs. Southern Norway). Expressions such as Northern and Southern used in farm names in **S1** seems to be based on a system of 4.

5.7.2 Distances

The expression 'mile' needs to be divided into at least five different types of miles used in **S1**.[71] In addition, there are other expressions of relations used, such as statements of closeness and contiguity.

Each use of each of the types is unique. As there are no exact measurements behind the statements in the text, we are dealing with a set of particulars which were only roughly similar. These particulars are grouped, as people do when they use expressions such as 'mile'. People used to travelling a landscape can give reasonably accurate measurements of distances after having walked the terrain.

However, it is difficult for me to evaluate what was meant by their statements, because many of the types are unknown to me. What kind of mile is used and what length each of them was supposed to have is unknown to a modern reader in many cases. We do not even know what a measurement is meant to measure, spatial distance or travel time, even if the names may indicate one or the other, e.g., "day's travel" ("dagsreise"). It is even questionable whether spatial distance and travel time were indeed different types of measurement seen from the eighteenth-century perspective. One of the few concrete facts we do have is the length an official (new) mile was supposed to have: 11.3 kilometres.

So the situation for distances is similar to the one for directions discussed above. Exact distances cannot be known. This means that not only *can* I choose an arbitrary value within a range of possible values and potentially change this choice, I actually *have to* make such a choice.

5.7.3 Coordinate systems

What are the consequences for my work of the lack of absolute locations in **S1**? The idea of absolute locations in cartography is based on an imaginary coordinate grid superimposed on the surface of the earth according to mathematical rules. The whole or a part of this grid is copied down to the document

[71] There are also other length measurements used in **S1**, such as rifle shot; se the discussion in Eide (2011) for details.

becoming a map, forming its fundamental spatial structure. Any expression in the syntax or syntactics[72] of such a coordinate system, given in a text or on a map, identifies an absolute location in the geographical sense of 'absolute'. On a map, interpolation gives absolute locations for the entire surface of the map, although it is expressed explicitly for the grid only. For a text, a similar effect is found if one place is specified absolutely and other places are specified in relationship to this first place. But the specifications of the related places are less accurate, and their locations are not absolute.

In **S1** there are no absolute locations. No coordinate system is ever mentioned. If we recall the definition of a place name from page 77, the crucial aspect is that the place name consists of one or more words which evoke the notion of a particular place. This evocation may depend on the context. If we are reading about Australia, 'Victoria' may evoke a different place than it would if we were reading about British Columbia. In the discussion here, place names are seen together with other strings referring to places. All such strings, including place names, refer to a place in the real-world by virtue of its letters and by its textual context. The referring string also co-refers with places in other representations of the real-world, including maps, texts, and human memory.

An important characteristic of digital mapping is that information can easily be combined spatially. If one makes one map layer based on **S1** and another map layer based on one of the maps Schnitler drew, then both of them can be combined with a third layer based on a modern map of Scandinavia. This is done by linking coordinates for a number of fixed points and then extrapolating the alignment of the other parts of the map layers. The result will be inaccurate and will include errors, but it may still be useful for many purposes.

In this project such a process is excluded by definition. I have specifically forbidden myself any links to such external information in the interpretation involved in building up the model. The experiments are done without the use of pre-existing maps. This means that I cannot use the fact that I know where Trondheim and Røros are located in order to add geographical coordinates to

[72] 'Syntactics' is used by MacEachren (2004, 234–236) in the meaning of "interrelationships among signs" because he is unwilling to use 'syntax' for non-linear expressions such as maps.

the place names. I have only what I can read from the text, and the text contains only relationships between places referred to by place names or other strings of text. Any map I create will thus be floating outside all predefined coordinate systems. If I know nothing about the relationships between a place and other places from the text, it can only rest alone in its own map.

Chapter 6

Case studies

The final experiments were organised as four case studies, based on the experiences from the development, setup and testing described in chapter 5. The text fragments used are natural units within the text, and each of the fragments was treated as a separate unit. Two of the case studies were based on complete witness statements, and the other two on two shorter sections consisting of Schnitler's own words, that is, on parts of **S1** not presented as a direct representation of other people's testimonies or manuscripts.

The two witnesses whose testimonies are used in the case studies have been chosen to be different as persons: one is an old Sami who was previously a reindeer herder, and the other is a young Norwegian farmer living on a farm he settled himself. They lived quite close to each other.

6.1 Case 1: Povel Olsen

Povel[1] was a settler on the shore of lake Frostviig. He was born at the farm Leerbaken[2] in the same area around 1708.[3] Povel lived on and farmed a newly

[1]Olsen is not a surname, it is a patronym; Povel was the son of Ole. Therefore I use the given name to denote people like him. This was different for people like Peter Schnitler; Schnitler is a surname. As for Sami people, their naming system was not acknowledged by the government (Hansen and Olsen, 2004, 322) and the Norwegian names we know them by in the sources are likely to be different from the names used in their Sami communities.

[2]Modern name: *Leirbakken*, farm no. 8 in Lierne (Berg 1996, 153–154; Rygh 1897, vol. 15: 287).

[3]His age is claimed to be 34 years in 1742 (**S1**, 141).

settled farm, as did his younger brother and neighbour, who was also a witness (**S1**, 143). Their homesteads were situated 15 kilometres to the north-north-east of where they were born, as the crow flies.[4] Both the brothers belonged to a community of hard-working peasants; they grew up in poverty and were able to scratch a living and a surplus for taxes out of quite marginal land. Povel was interviewed on July 25, 1742 at the farm Sandviig,[5] which was less than 10 kilometres from the farm on which he grew up, and some 20 kilometres as the crow flies south-south-west of the farm he settled. He was clearly in his home area when he was interviewed.

His statement amounts to 13 paragraphs with a total of 771 words. This is a medium-sized interview. Several parts of what he said in court were not recorded as such; instead, they were replaced by statements that his answers were in line with those of specific previous witnesses. This is in line with standard procedure.

In the following, two paragraphs from his statement will be studied in detail. For each of these two paragraphs, the text will first be shown, together with an English translation, and then the modelling and experiment process, including the creation of maps, will be discussed. Then the scope will be widened and the results from the modelling of all of Povel's statements will be discussed.

6.1.1 Paragraph 42735

The first paragraph to be examined has ID number 42735 in GeoModelText. The paragraph is taken from **S1** (142). The original text is reproduced in figure 6.1, with an English translation in figure 6.2.

> Landskabet væsten for Nyebyggerne her er Gran- og biercke-Skoug med Fielde, og har jngen bønder til Naboer, førend 8te Miile der fra i Væster *Harrans*-bøjd i *overhaldens* Præstegield: Dog holde her jmellem endeel *Lap Finner* til.

Figure 6.1: Original text of paragraph 42735, taken from **S1** (142).

[4] All measurements in the biography are based on modern maps.

[5] Modern name: *Sandviken*, farm No. 22 in Lierne (Berg 1996, 427–440; Rygh 1897, vol. 15: 288).

The landscape west of the settlers here is spruce and birch forest with mountains, and there are no neighbouring farmers, before 8 miles to the west *Harran* in the parish of *Overhalden*. However, a few *lap finns* dwell in between.

Figure 6.2: English translation of the text of paragraph 42735.

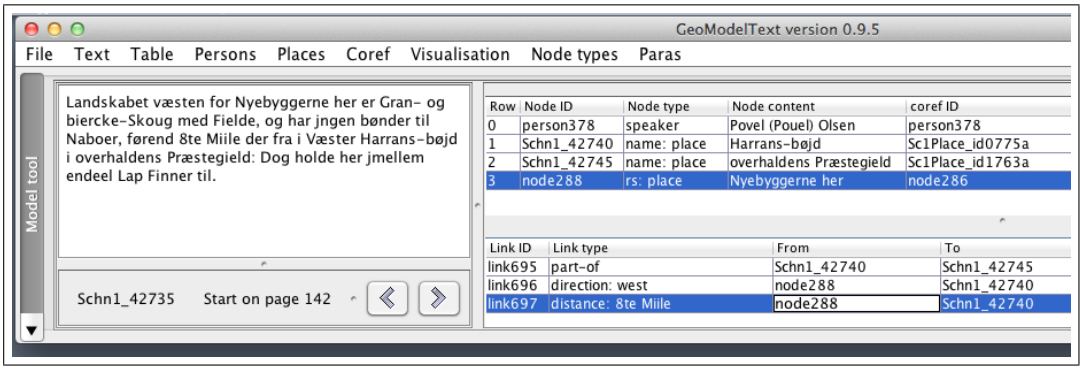


Figure 6.3: Screenshot from the modelling tool showing paragraph 42735.

Primary model

Two place names were identified in the TEI version of this paragraph: "Harrans-bøjd" and "overhaldens Præstegield". A third place identified in the text during manual modelling was "Nyebyggerne her" ("the settlers here") seen as a place, that is, the place settled by the settlers. A screenshot of GeoModelText as it was used in the modelling of this paragraph can be seen in figure 6.3, with the speaker, the three place references, and also three relationships between the places.

A list version of the part of the model which was created based on this paragraph can be seen in figure 6.4. Each "place name" was encoded as such in the TEI document, whereas "rs: place" denotes referring strings other than place names. The triples are shown with arrows between the domain, property, and range.

The three places referred to in the text and the distances and directions between them are modelled. In addition, a fourth place is added, the landscape west of the place where the settlers have their farms. Even if this area is not really described as a geographical object, features are connected to it.

- **speaker:** Povel (Pouel) Olsen
- **place name:** Harrans-bøjd
  - Harrans-bøjd → **is part of** → overhaldens Præstegield
- **place name:** overhaldens Præstegield
- **rs: place:** Nyebyggerne her
  - Nyebyggerne her → **in direction west is** → Harrans-bøjd
  - Nyebyggerne her → **in distance 8 miles is** → Harrans-bøjd
  - Nyebyggerne her → **in direction west is** → Landskabet væsten for Nyebyggerne her
- **rs: place:** Landskabet væsten for Nyebyggerne her
  - Landskabet væsten for Nyebyggerne her → **in direction west is** → Harrans-bøjd
  - Landskabet væsten for Nyebyggerne her → **has type** → Gran- og biercke-Skoug med Fielde
  - Landskabet væsten for Nyebyggerne her → **is inhabited by** → ingen bønder
  - Landskabet væsten for Nyebyggerne her → **is inhabited by** → endeel Lap Finner
- **type:** Gran- og biercke-Skoug med Fielde
- **non-existance:** ingen bønder
- **rs: people group:** endeel Lap Finner

Figure 6.4: The statements in the primary model of the text of paragraph 42735.

To be able to include these features in the model, "Landskabet væsten for Nyebyggerne her" ("The landscape west of the Settlers here") is added as another string referring to a place. The place is located between "Nyebyggerne her" and "Harrans-bøjd", which is shown by two triples with "in direction west is" as properties.

There are several features connected to this **rs: place**. First, it is given a type, which is a description of the landscape type of the area. Then there are two triples with "is inhabited by" as their properties. In order to understand these two, the reading of the text must be explained in more detail.

It is stated in the text that the settlers have no farmers as neighbours before Harren, which is 8 miles to the west, and that positive statement is modelled as such: once one goes 8 miles to the west, one will find the place Harran, part

of the parish of Overhalla. In Harran there are farmers to be found. These farmers are the nearest farming neighbours to our settlers, at least in that direction.[6]

The problem is the explicit statement that there are no farmers in the area between the settlers and Harran. This is modelled in the triple with "ingen bønder" ("no farmers") as the range. This modelling is problematic in two different ways. First, is this really modelling the negative statement? How should we say in the language of the model that there are no farms in a specific area? The negative statement must be modelled differently from how we model the other similar-looking fact, namely, that there are "endeel Lap Finner" (some Samis) in the area. In the latter case, the land of the Sami is a part of the area, spatially speaking, but we are not modelling any farms. The witness is not pointing to a farm, saying "that farm is not in the area I am talking about". He is rather saying something about the area: that it is an area without farms. Thus, it has to be modelled as a triple in which the domain is the area where there are no farms, the property is "is inhabited by" and the range is "no farmers". This can be done, but we will see below that it is difficult to formalise such a statement.

To make this distinction clearer, it is necessary to understand that we have two different types of statements. First, we have a negative statement: there are no farmers in a certain area. Then we have the two other statements, of an area where a few Sami people dwell and an area with spruce and birch. In the latter two the ranges are actual entities—Sami people and vegetation, respectively. So instead of a specification of the landscape, as in the case of nonexistence, we have here a relationship between the landscape and other existing things.

The second problem with the modelling is the fuzzy borders of the areas. We do not know the northern and the southern borders of the area where there are no farmers. The borders of the area are fuzzy, and I cannot know if it is similar to the other areas we discussed above, because the text is silent about this. In the model, all three areas—that is, the one with spruce and birch, the

[6] I could have added an undefined number of farms as part of Harran, but I omit this for the sake of simplicity.

one without farmers, and the one with the Sami—are seen as the same spatial area. This is an interpretation; I have made a choice about how to read the text. Other choices could also have been possible.

Formalised model

In order to get from the primary to the formalised model, choices had to be made. How should the statements shown in figure 6.4 be interpreted? Based on the results from the previous chapter, the direction "west" was formalised to 270°. As for the 8 miles, we do not know what kind of miles they are talking about, so the category "miles unknown" was used, in this case formalised to 8000 meters. The property expressing the fact that Harran is part of Overhalden was formalised as "part of". The last three properties, of types "has type" and "is inhabited by", were added not as properties connecting two places together, but rather as properties expressing some further information about the place that was the domain of the expressions, namely "Landskabet væsten for Nyebyggerne her". It is quite clear that expressing "ingen bønder" ("no farmers") is awkward as it is formalised here, but I found no better way of doing it.

In addition to this, co-references are added to the place references, connecting them to the other textual expressions referring to the same places. This means that for Harran, the ID used in the further modelling will be the value of the element in the place name index, and the link to this specific use of the place name is no longer maintained.[7]

Maps

Before maps could be created, some further choices had to be made, including the size of the polygon for "overhaldens Præstegield" and the fact that the other places are expressed as points. The most striking feature of the map, which can be seen in figure 6.5, is the fact that it consists of only a few elements. It is also true that a rectangle looks rather strange as a symbol on a map of this area from that time. There is, however, nothing in the decontextualised text

[7]The use of co-reference does not add any links to this part of the model, as none of the place references in the paragraph co-refer.

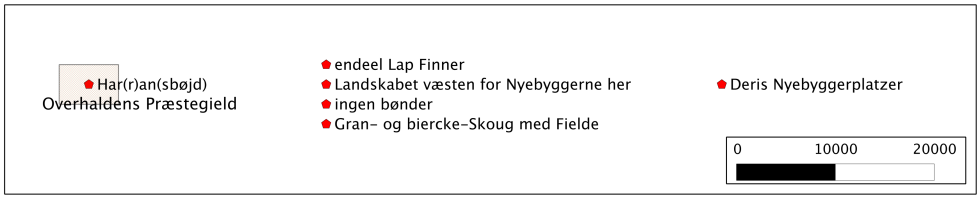


Figure 6.5: Map based on the model of the text of paragraph 42735. Scale in metres.

speaking against the choice of a rectangle. It is also worth noting that even if the points are points in the vector data, they are presented on the map as small polygons. There is no way to present a visible point other than as an area.

A number of statements are added as texts in the middle of the map: "Gran- og biercke-Skoug med Fielde" ("Spruce and birch Forest with Mountains"), "ingen bønder" ("no farms") and "endeel Lap Finner" ("Lap Finns dwelling"). Together with them is the area they are connected to, "Landskabet væsten for Nyebyggerne her" ("The area west of the Settlers here").

The symbol for "no farms" is awkward, well in line with the problems we had in the modelling of this fact all the way. Why use a symbol to show absence? Why not use absence to show the absence instead? The answer is that lack of any symbol for farms in the middle of the map would not say "no farms". As we will see in chapter 7, a blank area on a map is usually too general to say anything about farms specifically.

The use of point symbols for the four items in the middle of the map is arbitrary and looks strange. However, to use polygons would not have been any better, as we know too little about the areas. How large should the polygons be? Normal map polygons have clear borders. Should the four areas be identical? Graphically fuzzy polygons could be a solution, and another solution would be free-floating texts without any symbol at all.

Be that as it may, the fact that it is difficult to find a good way to put these things on the map is an indication that we are on the track of something interesting. And the fact that the negation is even more difficult than the other facts is an important finding, which will be discussed in detail below.

6.1.2 Paragraph 42677

I will now show the results from experimenting on another paragraph, this time a slightly longer one with a few more relationships than the previous one. The text is in figure 6.6, with the English translation in figure 6.7. The study of this paragraph focuses on the choices made when establishing the formalised model, and the consequences this has for the way maps will look.

3de Spørsmaal: *Resp*: Sønden for deris Nyebygde Platzer ligger der fra 1/2 Miil dend Gaard *Qvæljen*, 1: miil dend Gaard *Leerbaken*; Landskabet der jmellem er Gran- og Biercke-Skoug med nogle Field-*Ruver*; J dend Strækning jmellem *Frostviig*-vandet og *Qvæ*-Søen ligger 2de *Qværn* berger under gaarden Qvæljen; Hvilcke Bønder, Ligesom de andre af Nordre *Finlje* leeve af deris Eng-land, Fiskerie og Skytterie og Gemeenligen maa holde Sig af Furru-brød Som Sielden der Korn Voxer. —

Figure 6.6: Original text of paragraph 42677, taken from **S1** (142).

3rd question: *Answer*: South of their settled farms is a 1/2 mile from there the farm *Qvæljen*, 1 mile the farm *Leerbaken*; the landscape in between there is spruce and birch forest with some mountain *tops*; in the area between the lake *Frostviig* and the lake *Qvæ* lie the 2 *Qværn* mountains under the farm Qvæljen; whose farmers, like the others in Northern *Finlje*, live off their meadows, fishing, shooting and often must rely on pine bread, as grain rarely grows there. —

Figure 6.7: English translation of the text of paragraph 42677.

Model

The places referred to by names and other referring strings, as well as the spatial relationships between them, are listed in figure 6.8. All the places are connected to one another, directly or indirectly. Some details about the use of the land and about the landscape types are omitted in this example to show more clearly the spatial relationships, as is the implicit **part of** reference to Northern Finlje.

"Qværn berger" could have been interpreted differently. It could be that it was not used as a place name, but rather a common noun phrase referring to the two mountains where they cut millstones (*qværnstene*). This would,

- **place name:** Qvæljen
- **place name:** Leerbaken
- **place name:** Frostviig-vandet
- **place name:** Qvæ-Søen
- **place name:** Qværn berger
- **place name:** Qvæljen
- **place name:** Nordre Finlje
- **rs: place:** deris Nyebygde Platzer
  - deris Nyebygde Platzer → **in direction south is** → Qvæljen
  - deris Nyebygde Platzer → **in distance 1/2 mile is** → Qvæljen
  - deris Nyebygde Platzer → **in direction south is** → Leerbaken
  - deris Nyebygde Platzer → **in distance 1 mile is** → Leerbaken
- **rs: place:** 2de Qværn berger (node287)
  - 2de Qværn berger → **is part of** → Qvæljen
  - 2de Qværn berger → **is between** → Frostviig-vandet **and** Qvæ-Søen

Figure 6.8: Primary model of the text of paragraph 42677.

however, not lead to any substantial changes in the modelling; the only change would be that the place name would be replaced by a referring string.

Map

In order to make a map of this model, many interpretations must be made. First, is a place a point, a line, or a polygon? This is based on perspective, and often the scale of the map will decide. I have chosen to see places as polygons if their areas contain one or more other places, but as points otherwise. The following is a list of a few other choices I made:

1. South: 180°, that is, straight down.[8]

[8]When modern Western people look at a map, they are likely to say that the top of the map, based on an orientation which they infer from the text printed or written on the map, is north. On second thoughts, people with some map knowledge will know that the top of the map *is* not north, it *represents* north. This becomes evident when one gets familiar with maps from times and places where other orientations were common, e.g., the maps from medieval Europe where the top of the map represents east or Mesoamerican maps which

2. Default width and length of a place polygon when no measurements are given: $4000 * 6000$ meters.

3. Default distance in X and Y direction of something between something else, when distance is not given: $500 * 200$ meters. This puts one of the outer objects right and a little up; the other one is left and a little down from the centre object.

4. The length of a mile when type is not specified: 8000 meters.

Figure 6.9: Map based on the model of the text in paragraph 42677, version 1. Scale in metres.

These choices led to the map shown on figure 6.9. Choices 1 through 4 above were all more or less arbitrary, however. What if other values are chosen? I tried to replace the values in GeoModelText with the following ones:

1. South: 160°, that is, south with a slight eastern bend. It is well within what would generally be accepted as south, in the eighteenth century as well as now.

could be seen from any side (Woodward and Lewis, 1998, 203).

2. Default width and length of a place polygon when no measurements are given: $1000 * 500$ meters.

3. Default distance in X and Y direction of something between something else, when distance is not given: $1000 * 2000$ meters, which puts one of the outer objects up and a bit to the right; the other one is down and a bit to the left from the centre object.

4. The length of a mile when type is not specified: 6000 meters.

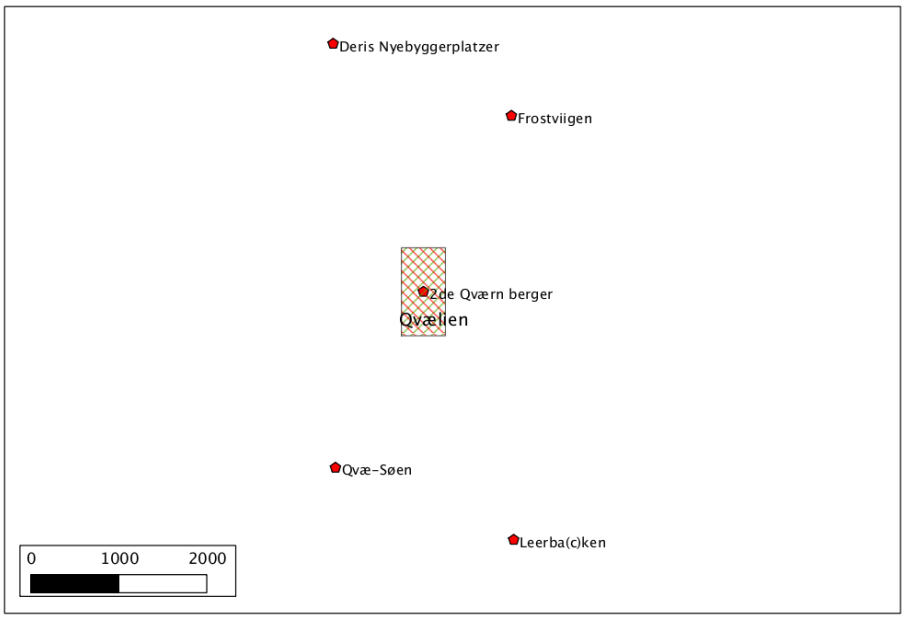


Figure 6.10: Map based on the model of the text in paragraph 42677, version 2. Scale in metres.

This resulted in the map found in figure 6.10. Note that none of the symbols has been changed, but the geometrical impression is still quite different. Although there are some similarities, the two maps clearly depict different landscapes. However, they are both supported by the formalised model, and, more importantly, they are both supported by the text of paragraph 42677. So they both depict the same text.

This example shows how the text opens up possibilities for different spatial models, which is an example of what I refer to as *underspecification*. The degree

to which a text such as **S1** is underspecified is surprising and represents a major finding in this research. It will be discussed further in chapter 7, where the term 'underspecification' will be formally defined, and the consequences of this result will be analysed and interpreted from different perspectives.

6.1.3 The rest of the paragraphs

Povel's witness statement includes eleven more paragraphs, in addition to the two studied in detail above. These eleven paragraphs contain variations over the same problems as the ones we have already seen, which will not be repeated. However, I will mention briefly some additional things that came up.

There are several references to how people related to the land in the witness statement made by Povel. This is geographical because it is connected to the landscape, but it is also historical. How can a geographical model be distinguished from a historical one? The history of an area is connected to its geography, and vice versa; time and events are interconnected with space and place.

The question of geographical information that cannot be put on a map depends on such distinctions. If some of the information in question is seen as historical only, and not geographical, then the question becomes irrelevant; it is not mappable because it is historical. But it is impossible to draw a line between history and geography, between time and space. This will be discussed further in chapter 8.

The question of context—in this case, the border between language understanding and world knowledge—is problematic. Several examples of this problem are found in Povel's witness statement. If an area is said to be close to another, the two areas are generally seen as not overlapping. This follows from reading and understanding the text. And when a place is part of another place, the latter covers the former fully, but the two are not equal. This latter understanding is also a part of understanding the textual expression.

There are, however, considerations along similar lines that are not parts of the understanding of the text, but rather of the context I have chosen to exclude. These considerations include the fact that a river is a lengthy object

with a certain size, or that a lake is not rectangular. As I have made the distinction, these two latter examples are not part of language understanding, but rather of world knowledge; that is, they are parts of the context I chose not to see.

6.1.4 Seeing Povel's statement as a whole

We have seen maps based on the spatial information in each of the two paragraphs studied in detail above. However, the automatic vector data generation of GeoModelText was not developed to a level where vector datasets, and thus maps, could be created for the full model of the statement made by Povel in all his 13 paragraphs. The totality of his statement will instead be discussed based on a systematic study of the number of places discussed in the interview and how they are described and connected.[9]

The same problems apply for the whole of his statement as for the smaller datasets we have already investigated: many choices must be made, and some things are hard to map. In what follows, I will focus on the former. It is quite clear from the evidence already presented that it would be possible to make a whole series of different maps based on the model of Povel's full statement. The examples in figures 6.9 and 6.10 show the principle. For most of the objects, there is more or less leeway in how they can be interpreted.

A statement giving only a very limited leeway would be "A is exactly 1.03 km from B, in a direction of exactly 87.6°". There are no such statements in Schnitler. For distances, measured miles are the best we can hope for; they are supposed to be 11.3 km, but they are not counted accurately. The longest distance for which $\frac{1}{4}$ mile is used is $2\frac{1}{4}$. The next possible value, $2\frac{1}{2}$ miles, is 11% greater than $2\frac{1}{4}$ miles, so the precision is less than ±5%. For one 11.3 km-long mile, even this maximum precision would give a leeway of more than 500 meters in each direction. In general, the precision seems to be significantly lower.

[9] A map of all Povel said would not have been easy to comprehend in a printed thesis anyway; it would have needed an interactive system to really be understood. As we will see in chapter 9, generating maps based on larger models is an interesting path for future research. However, the publication of such research may need to be done digitally in order to be fully understood.

As for directions, the best would be a $22\frac{1}{2}$-degree section. So the best specified relationship between two places would then be a distance $\pm 5\%$ in a $22\frac{1}{2}$-degree section. Most of the relationships are less specified than that, many of them significantly less. Some places are not spatially related at all. Where there are no spatial relationship at all between two places, neither direct nor indirect, GeoModelText splits the vector model into two different map layers.[10] The places cannot be put on the same map.

If two places are connected through distance or direction, or through ether **part of** or **between** relationships, then GeoModelText connects them in the same map layer. Then choices are made as to the relative locations of the places. In some cases, these choices were taken within a rather limited room of possibilities, while in other cases the possibilities were close to unlimited. The case of no spatial connection at all is the case of unlimited possibilities, which is also where GeoModelText gives up the attempt to connect them.

The fact that I put places on different maps if they have no spatial connections is based on a choice. I could have chosen to make an arbitrary connection between spatially unrelated places in order to combine them in the same vector layer, in the same way as I chose the distance between two places arbitrarily when they had only the direction between them specified.[11] The choice was made because it was important to maintain a distinction between an explicit spatial relationship, even a poorly specified one, and no such explicit relationship at all.[12]

Povel's statement includes some 80 references to places, referring to 47 different places.[13] The largest set of interconnected places coming directly out of the model of the statements made by Povel based on these criteria contains

[10] Technically speaking, what happens is the opposite: places are in different layers from the outset, but are combined into the same layer when spatial connections are found. However, the result is the same.

[11] I actually made some attempts to put places on the same map also when there were no explicit relations between them. It really did not work, which strengthened my view that low specification and no specification are quite different things.

[12] Implicitly, the context of the protocols, and of each interview, give the general area where all places are located. But this belongs to a part of the context I chose not to consider.

[13] 47 is a maximum number of distinct places because some of the actual co-references may not have been detected, so that the real number of different places may be lower. More co-reference links could reduce the level of disconnectedness, but not remove it.

29 places. One other set includes 5 connected places, whereas 8 small sets have one or two places.

Places		
Type	**Count**	**Relative**
Total number	47	100.0 %
Has length	2	4.3 %
Has width	0	0.0 %
Has direction	2	4.3 %

Relationships between places		
Type	**Count**	**Relative**
Total number	48	100.0 %
With direction	12	25.0 %
With distance	13	27.1 %
Part of	17	35.4 %
Between	14	29.2 %

Table 6.1: Statistics for form and relationship for Povel Olsen. The sum of the different types of relationships is higher than the total number of relationships because some of the place relationships have both direction and distance specified.

Some simple statistics for the formalised model of Povel's statement can be found in table 6.1. Looking at the form of the places first, it is clear that the level of specification is very low. Size is given for only two of the 47 places, and in those two cases only length, not width, is given. The general direction (e.g., that a lake stretches from northeast to southwest) is also given for two places. There is almost no information in the text as to what the places look like, and thus, few clues telling us how they should be drawn. Some size restrictions are given by the relationships to other places, but only in a very vague way. In some cases, other indications related to both the form of a place and the relationships to other places are given, such as rivers connecting to lakes at specified places. But only a few such indications are given, and they are quite vague.[14]

All the places in the formalised model of Povel's statement have connections to other entities in the model. Places for which no relevant connections were found never made it into the formalised model. But this does not mean that all places in the model have *spatial* connections to other places. Places may have other types of connection, such as being the location of an event. However, most of the 47 places do have spatial connections to other places, but the spatial

[14]There are qualitative descriptions in the text as well, but they would not help us much in drawing the shape of polygons on a map.

specificity varies. Table 6.1 also shows the different connection types and the number of connections having each of them specified. When both **direction** and **distance** are given, we have the most specified relationships. **Part of** and **between** are less specific, spatially speaking.

The stress on spatial connections is not, strictly speaking, connected to the question of whether two places have a relationship that can be expressed on a map. Some non-spatial relationships can also be put on a map; thus, if two places are related only by both being farms, the relationship can be expressed by the use of the same symbol on the map. Still, such relationships do not help us in solving the fundamental problem. There is still no *spatial* relationship indicating where one is located relative to the other. They cannot be put on the same map in any other way than by guessing the location of one of them relative to the other. Their both being farms tells us that they can be represented by the same symbol, but not their spatial relationship.

One of the non-spatial relationship types between places is their belonging to the category of border signs. Some of the places that are put on different maps because there are no spatial relations between them are connected by the fact that they are all border signs. Although this common feature makes it possible to combine the places into a group on a map, by using the same symbol for them, it does not say how they should be spatially located relative to one another in the map. That is, we cannot tell whether border signs are indeed seen as belonging to a type and not as representatives of spatial locations at the border, wherever the border may be located in the understanding of Povel.

In cases like the last one there is a fine line between having a type and belonging to or touching a spatial object. Both the fact of being a farm and the fact of being a border sign include belonging to a class, but the class memberships are based on different principles. This becomes clear when map production is attempted. The border as it was conceptualised by one person could have been defined as a line object, with all the places with type **border sign** located on this line. Further, the fact that they are mentioned in a certain order can possibly be used as an indication of their spatial order.[15]

I chose to see the claim that a place is a border sign as a type classification

[15]The is investigated for a somewhat older material in Schmidt (1983).

rather than a statement that the place is located on the border. It is not clear to me whether and how a border existed in the minds of the witnesses. After all, the absence of an agreed-upon borderline was the main purpose of the whole border process. However, the use of type was a choice which could have been made differently. The other choice—seeing all the border signs as points on one long linear object—would have reduced the disconnectedness of the maps, but it would not have removed it.

The fundamental problem is the following: In a communication situation it is common to mention a well-known place without specifying where it is in relation to other places. This will still give its location to an informed reader, as we remember from the definition of place name cited on page 77: the place name should, when it is used within the group of people knowing it, "instantly evoke ... the idea of one particular place through an association by contiguity" (Olsen, 1928, 5, highlighting in original).

The place name gives the location of the place through this association, and through the location it also supplies spatial relations to other places. These relations are not drawn from the text, but from the knowledge of the reader. The writer is also a reader under this perspective: he is the first reader. Some of the readers, even the writer, may not know where some of the places are. Then they will have to fall back on the spatial relations given by the text in order to get an idea of the whereabouts of the places based on other places whose location they do know. In my modelling, a situation where the reader knows about none of the places referred to by the place names is simulated.

6.1.5 Summing up

We see two things in the discussion of Povel's statement. First, there are passages of the text which are difficult to model, and which are hard to express on the map. Second, there is no way to choose one and only one correct way of expressing what we are able to put on a map. Povel was not chosen as an exemplary witness in order to show these problems. Similar passages are frequent throughout **S1**.

The next cases are based on different persons; first Ole Nilsen, an old Sami

reindeer herder, and then Schnitler himself. They will show other problems in line with the ones we have just seen.

6.2 Case 2: Ole Nilsen

Ole Nilsen was born just after 1662[16] in the forest close to the lake Giormsvandet.[17] He was baptised, but learned only a little about Christianity before the arrival of Thomas von Westen, the first leader of the mission and the main figure in its establishment. According to Bergsland (1985, 56–57), he was among the Sami taken in by von Westen in 1923 for a month of intensive work with the goal of turning them into good Christians, as the missionaries saw it.

When giving testimony to Schnitler, Ole documented his lease of land with a document signed by the local bailiff and dated in 1699 (**S1**, 150). In addition to this, he had inherited rights to thirteen *saajve* (Bergsland 1985; Gauslaa 2007, 33–34). The *saajve* refers to a complex system of relationships with spirits in mountains, having spiritual as well as practical consequences in the Sami society (Rydving, 2010, 120–123). Ole used the forests in summer, whereas in winter he used the border mountain HaarKølen,[18] for the use of whose Swedish part he occasionally paid the Swedish Sami. It is interesting that Ole had rights to the areas he used to possess based on all three systems: Sami, Danish-Norwegian, and Swedish.

Ole had lived his life as a reindeer herder, regularly moving distances of 50 kilometres as the crow flies with his animals. He had grown up in the area and also worked for others in areas nearby. He gave testimony almost 100 kilometres away from the area he used to possess. He must have been a well-travelled person who knew quite large areas in the mountains as well as in the lowlands.

Ole was interviewed at the farm Sollem[19] in Harrans annex parish, some

[16]His age is claimed to be towards 80 years in **S1** (150).

[17]Jormvatnet, now in Sweden, some 15 kilometres north-east of Povel Olsen's farm. All the measurements in the biography are based on modern maps.

[18]Hartkjølen, some 50 kilometres south of their summer forests, now mostly in Norway.

[19]Modern name: *Solem*, farm no. 44 in Grong (Strand 1993, 266–267; Rygh 1897, vol. 15: 297).

70–80 kilometres as the crow flies west of the territory where he used to herd his reindeer. His statement amounts to 28 paragraphs with a total of 2068 words. The statement includes a detailed biography of his long life, which is the main source for the presentation above. The modelling process will be discussed in less detail here than was the previous case study. The situations we saw for Povel were found for Ole as well. I will rather focus on new types of problems that were not found in the previous case. But before I proceed to that, I will give some statistics for the structure of his statement similar to what we saw for Povel above.

Places		
Type	**Count**	**Relative**
Total number	115	100.0 %
Has length	13	11.3 %
Has width	12	10.4 %
Has direction	13	11.3 %

Relationships between places		
Type	**Count**	**Relative**
Total number	155	100.0 %
With direction	55	35.5 %
With distance	43	27.7 %
Part of	55	35.5 %
Between	28	18.1 %

Table 6.2: Statistics for place form and relationship between places for Ole Nilsen. The sum of the different types of relationships is higher than the total number of relationships because some place relationships have both direction and distance.

In Ole's statements there are a total of 215 references to places. These 215 expressions refer to 115 different places.[20] The total number of relationships between places is 155, as shown in table 6.2. The specificity of the relationships is higher than the one we found for Povel. The percentages of **distance** and **part of** are more or less the same, but there are more **directions** at the expense of **between** here, which gives a higher level of specificity.

When we look at descriptions of places, the difference is even clearer. **Length**, **width** and **direction** are all used for more than 10% of the places in Ole's testimony, compared to less than 5% for Povel's. So Ole describes form more than Povel. Still, even Ole gives no such descriptions of form for almost 90% of the places.[21] This indicates that even if there is room for some

[20]Similar questions of co-reference as the ones asked for Povel is relevant here, so the number of distinct places may be lower.

[21]When one of the three is given, the other two are usually given as well for Ole. Thus,

variation in descriptions of the form of places, the level is still low. The witnesses depend on the instant evocation of the particular place in the mind of the reader—perhaps not consciously, but at least such dependence is part of their way of expressing themselves.

A limited type of evocation can occur even for unknown places, when a reader understands what kind of a place is described. He may know some general things about, say, lakes or mountains in the area. Even without specific knowledge of one single lake, he would have some idea of a typical lake. Lacking evocation of the particular, the type can work as a fallback. Still, this is rather limited. Lacking the evocation of the particular place, the reader may also let it pass as unimportant, or, if it is seen as important, he may use external means to find out more about the place in question. People present at the interviews could have asked other participants, whereas officials working with the written testimonies at the court in Copenhagen could have used a map or other written sources, or asked a person with local knowledge.

6.2.1 Only one

If we remember the problem of negation in the previous case study, we can see how it is related to another problem, highlighted in this sentence: "South of Himself he knows no other Finn than Breed Thomes Tomesen."[22] The primary modelling of the sentence can be seen translated to English in sentences 6.1 and 6.2. But does this modelling really catch the meaning?

$$\begin{aligned} &\text{Him (i.e., his dwelling)} \rightarrow \text{in direction south is} \\ &\qquad \rightarrow \text{Breed Thomes Tomesen's dwelling} \end{aligned} \tag{6.1}$$

the numbers of **length**, **width** and **direction** cannot be added up, as mostly the three of them are connected to the same places.

[22] "Sønden for Sig kiender hand ingen *Finn* meer end *Breed Thomes Tomesen*" (**S1**, 152).

Him (i.e., his dwelling) → in direction south is
→ only one Sami dwelling (6.2)

The fact that it is based on his knowledge, expressed as "he knows" in the text, is not really an issue; this is implicit in any statement made by him as part of his speech act anyway. Such a strengthening of subjectivity does not really change anything. The problem is that there is only one Sami ("Finn") in a certain area. I chose to model it as a type event in the primary model. This type event is connected to an unspecified area; it takes place somewhere south of the speaker's dwelling. It follows from this interpretation that the area of only one Sami is not specified as being related to the area in which Breed Thomes Tomesen dwells.

Another solution would have been to connect the two areas. In that case, I could have decided to interpret the area to the south as an area of only one Sami dwelling, and then seeing Breed Thomes Tomesen's area as one part of the area of only one Sami dwelling, or alternatively, seeing both features connected to the same area.

The questions are open, and can only be decided by making choices. Does Tomesen's area actually fill the area of only one Sami? Could it be that the meaning of the utterance rather is that the whole area is used by Breed Thomes Tomesen so there is no room for others? The first word of Tomesen's name, "Breed", is not a common name, but it is a Norwegian adjective meaning 'broad'; one would assume this is used because the person is physically large (or, in an ironic sense, because he is small), but could it rather indicate a person demanding much room for himself?

These things cannot be known from the text. We need external sources to know them; if we have no access to such sources, we are left guessing, as I did in the last paragraphs—or just accepting that we do not know. What is clear, however, is that there is an area to the south where there are no other Sami groups than the one of Breed Thomes Tomesen. A statement that there is only one is also a negation of there being more than one. Is this a fall-off situation

similar to the negation situation we saw above? How similar these are will be discussed in chapter 7.

6.2.2 Unknown border

The areas described by the witnesses usually have borders indicated by place names or other referring strings. Although these borders are not exact, spatially speaking, they are usually clear and reasonably well defined. In one of his answers, Povel is less sure, however:

> Their *area* stretches on the southern side to Vatsdalen specifically *Svanevandet* and *Hoetagen*; how far it stretches to the north of the *Ornes* Mountain, he does not know, at the eastern side it goes to the borders of the farm *Ringsøe* in *Jemteland*. —[23]

In the model, this northern border was modelled as an **rs: unknown place**; thus, it is a place, but we do not know where it is. The string referring to the place is "Somewhere north of Ornes-fieldet." The place has the direction from another place indicated, which is in line with what other places have, as we saw in the previous case.

But what about the explicitly stated lack of knowledge? Povel claims there is one. How can we convey it? How can we express on a map the difference between the cases where we lack knowledge because the text does not say, and the cases where the source of the text explicitly stated he did not know? This information made it to the primary model by the use of the type **rs: unknown place**, but such a type falls off during the formalisation needed to make the vector data for the map. Even if it may be possible to find ways to express the level and type of uncertainty in the formalised model as well, it is difficult to do so on the map. We are left with the option of adding it to the map as a textual comment, a solution which is less than ideal, as we will see in chapter 7.

[23] "Deris *district* Stræckcker (!) sig paa dend Søndere Siide til Vatsdalen Nemblig *Svanevandet* og *Hoetagen*; hvor langt den Stræckcker (!) Sig Norden for *ornes*-fieldet, veed hand ickke, paa dend østere Siide gaar den til den gaard *Ringsøes* grændser i *Jemteland*. —" (**S1**, 152–153).

6.2.3 Summing up

The main problems found in the cases of Povel and Ole are along the same lines. They will be summarised in section 6.4 below. There are differences between the witnesses as to how well they describe places and the types of spatial relations they include in the text. The differences for descriptions must be seen in light of a general low percentage of places being described at all. Reading and extensive modelling indicate that similar problems are found in many other interviews as well.

The main reason for running the case studies was to develop a basis on which to evaluate the hypothesis. In order to find other types of problems, I broadened the field by studying other types of text which can be found in **S1** as well. That added enough issues to build a thorough foundation for the process of scrutinising the hypothesis.

6.3 Cases 3–4: Peter Schnitler

In part I, we discussed the relationship between Schnitler and his assistant Røyem as writers of the manuscript behind **S1**. They are both hands, to speak in the language of manuscript description; yet it is clear that Schnitler had the main responsibility. We do not know how much he actually controlled or steered Røyem's work, but we know he accepted it. I will follow the manuscript classification in the archive and use the name "Schnitler" to denote the actual author of the manuscript while accepting that the manuscript was not his product alone.[24]

In the sections based on witnesses, Schnitler as the author partly stepped aside to let other voices come through. In this section I will study small excerpts from the parts of the text in which his own voice comes through loud and clear. Schnitler is different in many ways from both Povel and Ole, as his biography shows. He also had a different role, which may open up the possibility of

[24]In the catalogue of The National Archives of Norway, the title "Major Schnitlers grenseeksaminasjonsprotokoll" ("Major Schnitler's border examination protocol") are used for all seven volumes, cf. archive EA-4062 Danske Kanselli, Grensearkivet, series F—Grensereguleringen, L0010–11.

different results from the ones we have just seen. In the study of Schnitler, I will use two examples, one from an aggregation and the other from a route description.

6.3.1 Case 3: Aggregation

In the introduction to this thesis, one example of the problems Schnitler faced when he made maps was shown with reference to the map fragment in figure 1.1, where two places of which either one or the other was a border mountain were both put on the map, crossed by the border symbol without any indication of the 'either-or' of the text. I do not know how problematic Schnitler saw that specific situation as being when he drew the map, but it does present a problem when I use my method of stepwise formalisation on the sequence of the text from his aggregation describing the same landscape that the map was intended to depict.

XIV. *Amber-* eller *Baanesfield* ...
XIV. *Amber-field* ligger i Nord-Nord-vest fra *Riefield*, Grendsegangen vil gaae over Mitten af dette *Amberfield;* Thi efter 7. 8. og 9de Vidner af *Helgeland* svares Skat af dette *Amberfields* Vestre Side, til *Norrige*, og af dets østre Side til *Sverrige*. —
J *Raens* Præstegield have Vidnerne af ingen anden deres Grendse-field vidst, end af *Riefield* i Søer, og *Amber-field* i Nord: Men da man komm Nord i *Bejern* i *Gilleskaals* Præstegield, angav Vidnerne der et andet Grendse-Merke imellem *Raens* Gield og *Uma Lapmark*, nemlig *Baanes-field*, hvilket de forklarede, at ligge fra *Bejerns* første Grendse-Merke, nemlig *Stokke-field* i Syd-ost 1. god dags Reise, eller 4. Miile, og at *Amber-field* skal ligge et Støkke vesten for dette *Baanesfield*; dette *Baanes*-field, sagde de, at være et bart skallet Field uden Skoug, Græs og Maasse, slet ovenpaa, strekkende sig fra Vester i Øster, og at mit over dette *Baanes*-field Grendse-*Limiten* gik, givendes derfor den *raison*, at af dets østre Ende rinder en Elv i Øster ad Sverrig, og af dets Vestre Ende en anden Elv i Vester ad *Norrige* ind i *Virvandet* i *Raen*. Hvorledes denne *Difference* imellem *Raens* og *Bejerens* Vidner, angaaendes *Amber-* og *Baanes*-fielde er at *conciliere:* det kan vel ei vide; siden jeg ikke kunde have begge Stæders Vidner samlede til *Confrontation;* kan følgelig ikke sige: Om *Baanes*-field, og ikke *Amber*-field i *Raen* skal være Grendse-Merke? Hvilket er efter *Bejerens* Vidner; Eller om *Baanes*field er en Tang eller *particul* af *Amber*-field, og af *Raens* Vidner indbefattes under det Navn *Amberfield?* J hvilken sidste Fall begge Stæders Vidner kan *accordere* og stande ved Magt; *Jn dubio* siunes mig, at præsumtionen er for *Raens* Vidner, at de maa vide best, og have sagt rettest om deres Bøygdz Grendser, nemlig at *Amber-field* giør Grendse-Skielnet.

Figure 6.11: Original text of three paragraphs describing a border mark, taken from **S1** (174).

XIV. *Amber-* or *Baanes mountain*
XIV. *Amber-mountain* is in north north west from *Rie-mountain*, the border will pass over the middle of this *Amber-mountain;* because according to witnesses 7. 8. and 9^{th} of *Helgeland* tax is paid for the western side of this *Amber-mountain*, to *Norway*, and to *Sweden* for its eastern side. —
In *Raens* Parish, the witnesses had never heard of any other border-mountain than *Rie-mountain* in the south, and *Amber-mountain* to the north: But when one came north in *Bejern* in *Gilleskaals* Parish, the witnesses there named another border-sign between *Raens* Parish and *Uma Lapmark*, namely *Baanes-mountain*, which they explained to be located a good day's journey, or 4. miles, to the south east from *Bejern's* first border sign, namely *Stokke-mountain*, and that *Amber-mountain* is supposed to be located a distance west of this *Baanes-mountain*; this *Baanes*-mountain, they said to be a bare mountain without forest, grass and moss, flat on the top, stretching from west to east, and that across the middle of this *Baanes*-mountain the border-*line* went, giving for that the *reason*, that from its eastern end a river flows to the east towards Sweden, and from its western end another river to the west towards *Norway* into the *Vir Lake* in *Raen*. How this *Difference* between *Raen's* and *Bejeren's* witnesses, as regarding *Amber-* and *Baanes*-mountains is supposed to be *reconciled:* cannot be known, as I have not been able to collect the witnesses of both places for a *confrontation;* thus cannot say, if *Baanes*-mountain, and not *Amber*-mountain in *Raen* should be the border-sign. Which is following the witnesses of *Bejerens*; or if *Baanes*-mountain is a tongue or *part* of *Amber*-mountain, and by *Raen's* witnesses is included under the name *Amber-mountain?* In the latter case, the witnesses of both places may be in *accord* and their testimonies stand; *in doubt* it seems to me, as if the preference is for *Raen's* witnesses, that they should know best, and have spoken the truest of their district's borders, namely, that *Amber-mountain* is the border-marker.

Figure 6.12: English translation of the text from figure 6.11.

In the following, the three paragraphs from Schnitler's aggregation in which the situation in question is discussed will be examined. The paragraphs include his aggregation for this one specific border mark in extenso, and are shown in figure 6.11, with the English translation in figure 6.12. This example is chosen deliberately; although similar discussions occur a few more times, they are not very frequent in **S1**.[25]

Schnitler's voice is clearly speaking in this example. Still, he builds each statement about the landscape on one group of witnesses, and he does so in a very explicit manner. In the witness statements in the previous case studies there were no explicit statements about the sources of the information. The source for each and every statement was inherited from the whole set of paragraphs; it was the speaker of the paragraphs.

[25]Other examples can be found, e.g., on 168 and 197–198.

Schnitler's explicit presentation of the sources for each statement asks for a different type of modelling. The question of voices becomes more complex. If we think of the source of the utterances in the same way as we did in the previous case studies, then it is clearly Schnitler. But by looking at the text in figure 6.11, we realise that this is actually a discussion in which the various statements are attributed to groups of people. Schnitler uses his own voice to explicitly recapture statements made by specified groups of witnesses. Thus, the different statements have clearly marked voices within the paragraphs.

There is another difference between the two types of witness representation as well. When the witness statements are presented, each witness is allowed to speak for himself. The text is presented as if it were his own words. In this case it is different. Schnitler reproduces each group of witnesses' statements in a summarised way, presenting his own interpretation of their arguments rather than presenting their arguments as if they spoke themselves.

As for the content, this is more or less in line with all his aggregations, but the form is more implicit in the normal situation, the situation where he is able to reconcile the views of all the relevant witnesses into one coherent story. In cases such as the current one, where a debate takes place, the fact that he rephrases their views becomes clearer.

The fact that Schnitler switched between presenting the views of different groups of witnesses within the same paragraph led to a situation where the model had to include a number of statements in which another statement was the domain. This was necessary for storing the **source** relationships—that is, connecting each statement to the source for it. An example might clarify this: In a subject–predicate–object clause, such as sentence 6.3, the subject and object are both entities. But in order to express a source for this statement, the target of this source statement must be the fact that this specific group of people stated that Amber mountain was the border mountain. So the whole statement in sentence 6.3 is the target for the source statement found in sentence 6.4.

$$\text{Amber mountain} \rightarrow \text{has type} \rightarrow \text{border mountain} \tag{6.3}$$

$$\text{The witnesses in Raens Parish} \rightarrow \text{is source of} \rightarrow$$
$$(\text{Amber mountain} \rightarrow \text{has type} \rightarrow \text{border mountain}) \tag{6.4}$$

- **speaker:** Unspecified writer
  - Unspecified writer → **trust most** → The witnesses in Raens Parish
- **place name:** Amber-field
  - Amber-field → **has type** → border mountain
    - **source:** The witnesses in Raens Parish
    - **believe:** Unspecified writer
- **place name:** Baanes-field
  - Baanes-field → **has type** → border mountain
    - **source:** The witnesses in Bejern in Gilleskaals Parish
  - Baanes-field → **is between** → Raens Giel**d and** Uma Lapmark
  - Baanes-field → **in direction west is** → Amber-field
    - **source:** The witnesses in Bejern in Gilleskaals Parish
  - Baanes-field → **in distance a Bit is** → Amber-field
    - **source:** The witnesses in Bejern in Gilleskaals Parish
  - Baanes-field → **has description** → et bart skallet Field
    - **source:** The witnesses in Bejern in Gilleskaals Parish
  - Baanes-field → **has length direction** → west-east
    - **source:** The witnesses in Bejern in Gilleskaals Parish
  - Baanesfield → **is part of** → Amber-field
    - **type:** Tang eller particul
    - **conforms with:** The witnesses in Raens Parish
    - **conforms with:** The witnesses in Bejern in Gilleskaals Parish

Figure 6.13: A small part of the model of the text from figure 6.11, focusing on Amber-field and Baanes-field. "Unspecified writer" is the general voice of **S1**, which has been identified with Schnitler.

The visualisations shown previously would not really work for this sort of data because properties are here the ranges of the triples. Figure 6.13 shows how the contents of a small selection of the primary model of the paragraphs from figure 6.11 can be listed; it shows the parts of the model directly related to the two mountains. In the model listing, the expressions marked with as-

terisks; that is, the statements with statements as their domains are shown in compressed form. They should all have the form of sentence 6.4. Thus, the first triple under the place name Baanes-field should be expanded to what we find in sentence 6.5.

$$\text{The witnesses in Bejern in Gilleskaals Parish} \rightarrow \text{is source of} \rightarrow (\text{Baanes-field} \rightarrow \text{has type} \rightarrow \text{border mountain}) \quad (6.5)$$

What Schnitler does in this aggregation fragment is something the witnesses never do; at least, they are never shown to do so in the protocols. If they did, we must assume they were brought into clarity by Schnitler or other people present in the courtroom.[26]

Now, if we try to make map data based on the set of statements in figure 6.13, the result would be a map with both of the two mountains in question, Amber-field and Baanes-field, as border mountains. However, this is not in line with any of the two groups of witnesses as their views are presented by Schnitler; they both claim that one and not the other is a border mountain. If we instead choose to make two maps, one for each group of witnesses, then the maps will be more in line with the differences in views as they are put forward by Schnitler. But in that case, both of the maps would have to be presented together with a text explaining their relationship. The same would be the case if one dynamic map alternating between the two stories were made on a computer: it would still need a text explaining why it alternates.

So the consequence of this modelling is that even if all the statements can be put on one single map, such an expression would distort the meaning of what Schnitler said. The meaning can only be conveyed with the use of either two

[26]This points out what witnesses are recorded as doing. Another matter is that Schnitler himself sometimes mixes such discussions into witness statements, as is the case when he calls back a previous witness to comment on and confirm what the current witness says (**S1**, 51). The common habit of replacing answers given by one witness with a note stating they are in line with the answers given by a previous witness, as was mentioned in the introduction to case 1 above, is also relevant here.

maps or a dynamic map, but then an additional text explaining important parts of the message would be needed. Schnitler, struggling with his many recorded interviews, shows openly his problems with the incoherent source material. He describes a small evidence-based discussion, in a manner very similar to scholarly discussions.[27] This is in line with his method as it was described in part I.[28]

To conclude regarding the results from this case: the main difference between the part of the text studied in this case and the witness statements is that discrepancies are present within one paragraph and they are made explicit, whereas in the witness statements each statement could mostly be seen as one coherent story.

Taking one step back, we see that a text fragment can be either *coherent* or *incoherent*, spatially speaking, and that incoherence can be either *explicit* or *implicit*. I will later discuss further the consequences this will have for maps. For now, I will just note that in cases of incoherence, making one map for each coherent story seems like a good idea, as was suggested above. We saw in figure 1.1 on page 20 that Schnitler was not able to present the conflicting story on the map. Neither am I able to do so on one single map; I would need two different maps or a dynamic one. It also seems that an incoherent text can be divided into a set of coherent ones. Does incoherence always beg for a multiplication of maps? This discussion will continue in chapter 7.

6.3.2 Case 4: Route description

The other example taken from Schnitler's own words is a route description. Route descriptions are common in the parts of the text not reproducing witness statements. Sometimes they are presented as reports of journeys made by Schnitler and his company, in other cases as ideal descriptions; however, the difference is not important for how the landscape is described. A description

[27] In their study of scholarly argumentation in archaeology, Doerr et al. (2011) present a similar view to the one expressed in the modelling here, distinguishing the statements as such from the way they are used in the process of argumentation.

[28] To detect inconsistencies is an important part of scholarly argumentation. The fact that Schnitler is so detailed and thorough in his attempts to detect and sort out inconsistencies strengthens the view that Schnitler's work was rightly described as scholarly in part I.

reads as a representative of a general, ideal travel route and travel time, also in cases where the text describes actual journeys. The one included in figure 6.14, with English translation in figure 6.15, is an example of an ideal description.

Vejen til *Jemteland* den *ordinaire* gaar fra *Østbye* gaarder	
til Øye-field kand Reignis	1 Nye Miil,
der fra igiennem en liiden biercke Skoug ved dend væstere	
Ende forbie dend Sieø *Eesand* i øster til *Remmen*	1 Miil
der fra igiennem een liiden bircke Skoug til *Olvaa-Køl*	1 Miil
her fra igiennem Skougen til *Handøl* de 2de første gaarder i *Jemteland*	2 Miil
Nye	5 Miil —

hvilcken vej de Svenske A^{o} 1719: toge her af Landet, dog til Krogs 1 mil længere, hvor om næste bielage giiver forcklaring. —

Figure 6.14: Original text of a route description from **S1** (54).

The road to *Jemteland* the *ordinary one* goes from *Østbye* Farms	
to Øye mountain can be estimated	1 new mile,
from there through a little birch forest by the western	
end passing by the Lake *Eesand* in the east to *Remmen*	1 mile
from there through a little birch forest to *Olvaa-Køl*	1 mile
from here through the forest to *Handøl* the 2 first farms in *Jemteland*	2 miles
New	5 miles —

which road the Swedes in the year 1719 took from the country,[29] although from bending 1 mile longer, about which the next appendix will explain. —

Figure 6.15: English translation of the text from figure 6.14.

In the modelling of the route description shown in figure 6.14, the road from one place to the other is taken as a geographical object. The directions of these geographical objects are not given in the text. If I were to look at the wider context, the general direction would of course have been known, because Sweden is generally east of Norway in this area. But this is not expressed in any way in the text fragment.

[29]This refer to the retreat of the Swedish military forces after the attach on Trøndelag in the late part of the Great Nordic War.

Instead of trying to express the model of this text fragment as a map, I tried another option. I made a graph model where each place is expressed as a box with connected name boxes, and the distances between the places are expressed as connectors between the boxes.[30] In this way, figure 6.16 is the formalised model expressed as a graph. A few details included in the text, such as the type of landscape one would travel through, are excluded for the sake of clarity.

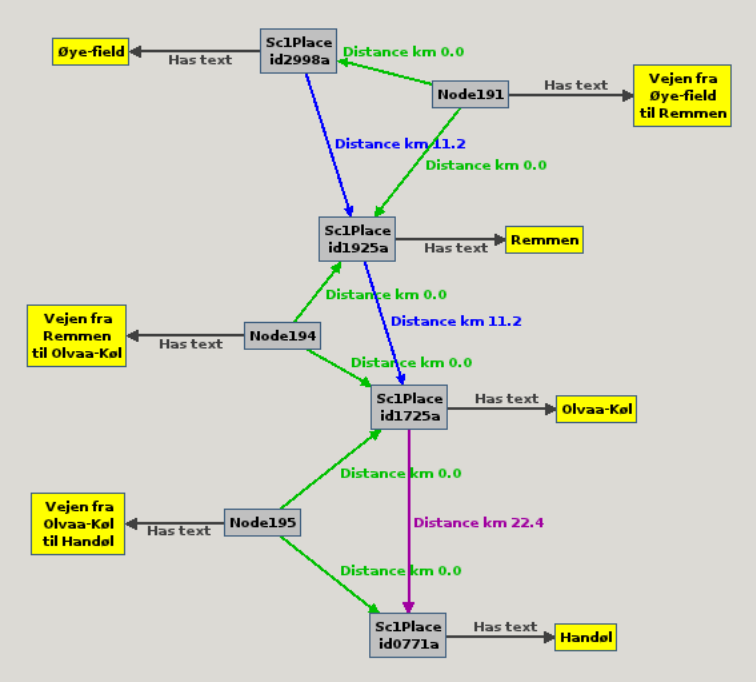


Figure 6.16: Visualisation of the formalised model based on the text from figure 6.14. For the sake of clarity, only the core route information is included, and the first part of the route, from Østbye gaarder, is omitted.

In the visualisation in figure 6.16, each part of the route is presented as a box with the name "Node" and a number, and with a connected **Has text** object with a text starting with "Vejen fra". The four named places have the

[30] Technically speaking, figure 6.16 is an excerpt from a visualisation of an RDF graph generated from the formalised model, using the tool **gruff**, webpage: http://franz.com/agraph/gruff/ (checked 2012-06-29). For further details, see the data package.

distances between them as relationships, expressed in the figure as arrows. Each of the route objects touches two named objects.[31] So we see in the graph visualisation, as we know from the text, that the "Node..." objects can be represented by a road from place to place, and we know the minimum length of each part of the way, which is the distance between the places. But even if the textual version has some descriptions not included in the model, we still do not know any details about how the route bends and turns; we know only the main travel distances from the text.

So we cannot make a map representing the route based on this information alone: numerous choices have to be made, as we have already seen. We would, for instance, have to choose a direction for each of the relations.

But there is another possibility which I decided to try out. Figure 6.16 has a certain resemblance to a topological map. Topological maps have weaker spatial similarity with the landscape than topographical maps.[32] They typically lack scale, and the directions are subject to change and variation relative to the landscape they represent. The relationships between points are maintained, though; a topological map is a map of the topology. This is the type of maps one often sees representing train or metro networks.

What would happen if we tried to express this model as a topological map? Is there anything to be learned from such an exercise? The text of the route description does not contain enough information to produce one specific topographical map, but it turned out that one and only one topology is readable from it; thus, one and only one topological map can be made from the text.[33]

In addition to what we usually have in topological maps, the text also informs us about the relative distances, so that the topological map in this case is made to scale; the road between one pair of places is double the length of the two other roads. But there is a difference between the connections between the places, on one hand, and the scale, on the other. The former is precisely as it was described in the text, whereas the latter has the inaccuracy

[31] The fact that they touch is expressed as a distance of 0.0 km.

[32] Topological maps were explained on page 32 above.

[33] One can, of course, make several topological maps which look quite different. But two topological maps expressing the same topology; that is, the same nodes and links between nodes, are essentially similar and are not seen as different topological maps here.

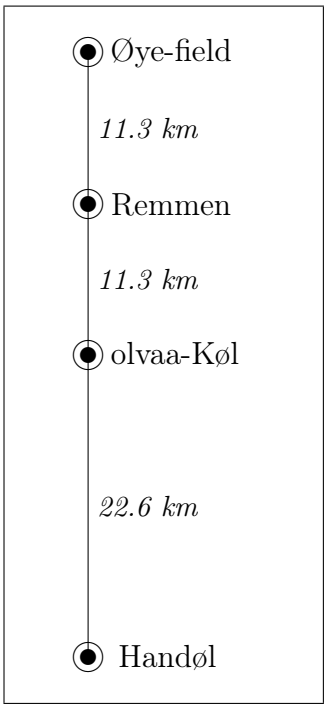


Figure 6.17: A topological map based on the model of the text in figure 6.14. Topological maps are usually not scaled, but this one is.

inherent in all distances in the text, and thus, the interpretation can be chosen to be different.

A preliminary conclusion to this experiment is that the text does not describe a landscape, which would be translatable to a topographical map, but rather a network, which is translatable to a topological map. In figure 6.17, such a topological map is shown. This map expresses the information from the text in figure 6.14 reasonably accurately, and it does not add much more than what is already in the text, only the precise number of kilometres.

There is currently a certain interest in using network analysis as a tool for analysing texts.[34] The results found in this case study support this as a viable way for exploring the interrelationships between places as they are expressed in texts. As for the current project, it only strengthens the case that one cannot make maps without significant loss of information, because what makes something a map and not another graphical figure such as a topological map is

[34]One example is the Hestia project (Barker et al., 2013).

exactly what we saw above: the scale and directions to be found in the map.

6.4 Results

In the previous chapter and through the case studies in this chapter, I have described the modelling of sequences taken from the source text, as well as the stepwise formalisation all the way to the maps. A variety of techniques within the general framework of my modelling method have been used.

The modelling has been presented, but it is impossible to express an entire model in the form of a text. This is due to the differences between the textual medium and the medium of a computer interface. How could it have been different? I am in the process of showing how texts and maps each can mediate only certain aspects of the total reality. In that perspective, it makes sense that the text cannot mediate every aspect of the model.

I will return to the theoretical implications of this later. For now, it is sufficient to note that in order to grasp the model more fully than what can be achieved through the reading of this text, one needs the interactivity of a computer. That is, one should use GeoModelText in the data package. One must be able to manipulate the model in order to fully understand it. It is still impossible to grasp the totality and all the details at once, even in interactive use, but by moving around, trying different things, seeing the material from different angles, manipulating the model, displaying exports from GeoModelText, and zooming in and out, one understands more than what can be learned from reading a text.

However, use of the interactivity of the computer program is only necessary in order to understand how the results were obtained. The results as such can be understood and evaluated in comparison with the text. So we are back at the distinction from the introduction to chapter 5: this text explains the results as well as how they are based on readings of the text fragments, whereas the data package is necessary in order to reproduce the process through which the results were found.

In order to summarise the results, I will look at the process of creating maps based on **S1** from two distinct perspectives. First, I will use the perspective of

the starting point—the text; then I will use the perspective of the end point, that is, the map. In the text I find a certain world view expressed. How close can I get to expressing the same world view as a map? The map starts out as a blank space. What is needed in order to fill that space?

6.4.1 What the text has to offer

The main relationships between places on maps are spatial. The map expresses accurately the spatial relationships between the various symbols. It is a tautological fact that these relationships are accurate; any two marks on a piece of paper are related in that way, although the relationship is not necessarily accurate in reference to the depicted landscape. In addition to these accurate spatial relationships, the map can express similarity between places through symbology. Each map or map series has a limited number of symbols that can be used to classify places, and identical or related symbols express some sort of relationship between places, usually at type level. Texts can also be put on the map, but normally for place names only.[35]

The text offers a coherent yet dynamic view of a geographical area. Places are related, but in flexible ways. This is lost when only the explicit relationships between places are expressed on a map, especially because the relationships are expressed accurately. Along the same line, the dynamic aspects of events are lost. Such events are not purely geographical objects; still, they have clear geographical aspects. Other aspects become less visible on the map.

The shapes of places and the relationships between them are known from the text with only limited precision, ranging from unknown to vague. There is always a level of uncertainty; we always have to read a map which is based on a text with the understanding that the relationships between places are based on choices. How can we then add another level of uncertainty? How can we convey the fact that there was an explicitly expressed uncertainty in the text as to the relationship between two places? How can we distinguish between the lack of specification following the medium, and uncertainty expressed explicitly

[35]This is on the main map image. A different story is the area outside the map image, called 'perimap' in Wood et al. (2010, 67).

in the same medium? The only solution I see is to add a statement about the explicit uncertainty as a text to the map.

Incoherence can be expressed in one single text, but it seems that more than one map is needed in order to express an incoherent description. If a spatially incoherent text can be divided into a set of coherent ones, then one can make a multiplicity of maps, where each coherent text gets its own map.

6.4.2 What a map needs in order to be filled

There are no absolute locations described in the text, so places are located only relative to each other. Without any spatial relationships connecting them together, two places cannot be put on the same map other than by relating them in a totally arbitrary way. It must be decided where a place is located relative to another place in order to make a map including both of them. This information may or may not be indicated in text, but it is never fully expressed. Thus, any map must be based on choices, even when we have spatial properties linking the places together.

So any direction or distance between two places expressed to the level of detail needed in order to make a map based on the words of **S1** is to a certain degree arbitrary. Further, places being described in the text as located close to one another may be identical, overlapping, or disconnected. This must be expressed on the map even if it cannot be known from the text. The same goes for the borders around an area. The map needs some sort of borders for many types of places, such as lakes, whereas the text often presents none. When we draw a place on the map, we have to decide on its form and size, but there is little or no such information in the source text.

Part III

Discussion

Chapter 7

Hypothesis and results

In this third and final part of the thesis, I will discuss the results from the former two parts. What kinds of implications do they have beyond the study of **S1**? The introduction in chapter 1 opened up a broad perspective, discussing texts and maps in general. The research reported in parts I and II has a much narrower scope. One single text and the milieu in which it came into being was the main topic.

This part will start with a discussion of the results from part II in light of the hypothesis from page 14. I will summarise how the hypothesis is supported and outline some implications of this support. Then, in chapter 8, the scope will be broadened. I will make a stronger, more general hypothesis and study it theoretically. In chapter 9, I will offer some conclusions and outline a few questions for further research.

The results found in the previous part came out of a series of case studies. In this chapter I will organise those results thematically. I will outline a typology of the situations in which problems occurred in the process of making maps based on the text. After that I will turn around: if one insists on making maps, how should one proceed? It is possible to make maps in all cases, if one accepts loss of meaning—but what exactly is lost?

The question of context has appeared several times; I will clarify how it stands after the experiments. This includes some consequences of my research into the understanding of how texts are usually "put on maps"—that is, using a known geographical background rather than creating new maps based on the

text alone. After that I will offer a conclusion to this chapter.

The hypothesis presented on page 14 states:

> *Types of geographical information exist that can be stored in and read from texts, but which are impossible to express as geographical maps without significant loss of meaning.*

I have not found one single paragraph in **S1** from which all the geographical information and only the geographical information in that paragraph can be expressed as a map, provided that the paragraph includes geographical information at all. There are always a number of choices to be made (underspecification), and sometimes constructions are found in the text that are hard to express on the map (negation and disjunction).

It is clear that the hypothesis is supported.

7.1 Classification of results

What are the implications of the support for the hypothesis? Which types of information are hard to put on maps? In this section a typology will be outlined. It has been created with the purpose of describing all the results found in part II. It presents an alternative view to the summary concluding the previous chapter, in which the "translation problems" from text to map were seen from two perspectives: what the text expressed, on the one hand, and what the map must express, on the other.

In the current typology, the problems found in the experiments are divided into three types: *underspecification*, *disjunction*, and *negation*. Further, two additional types are included: *impossible figures* and *fully specified textual descriptions*. Impossible figures were not found in the experiments, but this still needs to be discussed because I had predicted that they would be found. Fully specified textual descriptions are included as a base type to which to compare the others.

Thus, I will use the following typology to organise the results from the experiments:

1. **Fully specified textual descriptions.** *Only one map can be drawn based on the description. If the text mentions something, it is fully specified geometrically.*

2. **Underspecification.** *Based on such a text, more than one map can be drawn, and at least two of these maps are significantly different.*

3. **Ambiguity.** *The text includes expressions in the form "A or B is located at C".*

4. **Negation.** *The text includes expressions in the form "There is no A in B".*

5. **Impossible figures.** *The description of the geographical elements does not add up to a spatially coherent whole.*

Each of the groups will be discussed separately, before some common patterns are outlined. Type 2 represents the main finding and will be discussed in more breadth than the others. The discussion will be based on the results from part II, with which the typology is created to be in line.

7.1.1 Fully specified textual descriptions

I have found no examples of fully specified textual descriptions in **S1**. The type is included here as a baseline against which the other groups can be compared. However, in my experiments I have used a language which offers fully specified textual descriptions, namely, the language for vector data, Geography Markup Language (GML). GML is a formal language in the sense of specifying expressions that are completely explicit and totally complete.

We see an example of a GML fragment in figure 7.1. Such a "text" cannot be represented by two different maps as long as all the data are interpreted correctly. This is based on a certain sense of the word 'different', according to which two maps are different if their spatialities are significantly different. If the features of two maps are presented with different symbology (e.g., different colours on lines), the maps are not different in this sense, nor are they different if one includes small adjustments to the spatial layout of the other.

```
<gml:Curve gml:id="c22222" srsName="EPSG:4326">
  <gml:segments>
    <gml:LineStringSegment>
      <gml:posList>
        10.1 60.02 10.5 60.02 10.5 60.16 10.1 60.16
      </gml:posList>
    </gml:LineStringSegment>
  </gml:segments>
</gml:Curve>
```

Figure 7.1: Fragment of a GML document.

The three maps in figures 7.2–7.4 exemplify this. The maps in figures 7.2 and 7.3 are not significantly different, but they are both significantly different from the map in figure 7.4. As a rule of thumb, we can say that two maps made from a correct and complete interpretation of the same vector data are never significantly different. Having different underlying vector data is a necessary, but not sufficient, condition for the maps to be significantly different.[1]

Texts in natural languages look rather different from formulae such as the one in figure 7.1, and they are usually less specific.[2] Why are natural language expressions less specific? My tentative answer is twofold. First, it is based on media restrictions in the sign system of texts. This will be discussed in chapter 8. Second, textual descriptions are functional even if they are less specific, because one often does perfectly well without detailed descriptions. It seems that if one needs a high level of accuracy, one chooses other forms of expression than natural language texts (e.g., vector data and maps), or one marks what one wants to record on the ground instead. In order to understand this assumption, I must give some details of how the border was created after Schnitler finished his work.

According to the 1751 treaty (UD, 1967), the border between Norway and Sweden is a text. No map forms part of the legal agreement. But the text is, as outlined in the second appendix to the treaty, also an instruction for marking

[1]The condition is not sufficient because the differences between two sets of vector data may be insignificant.

[2]I do not claim that fully specified textual descriptions cannot be written in natural languages, but rather that they are uncommon in texts as we know them.

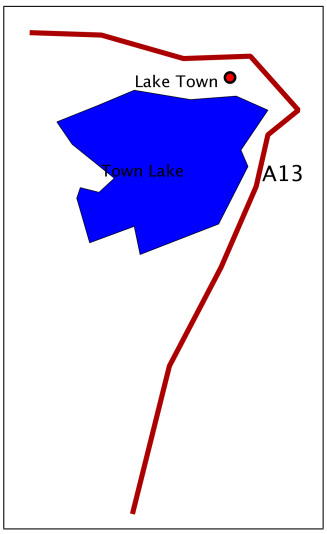


Figure 7.2: Map example 1.

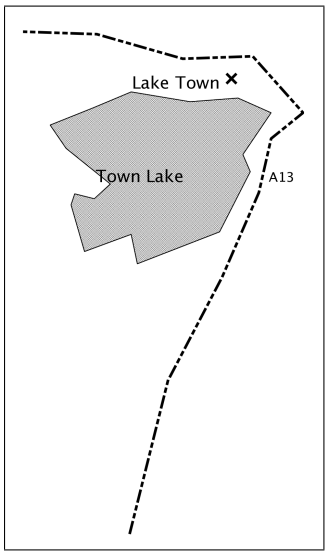


Figure 7.3: Map example 2. The only difference from the map in figure 7.2 is the symbology.

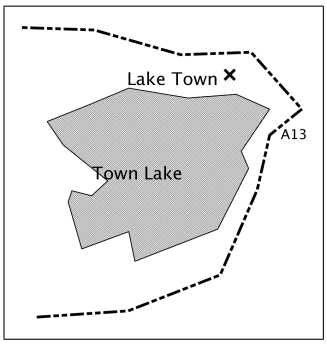


Figure 7.4: Map example 3. The road is different from the one on the maps in figures 7.2 and 7.3.

the border in the physical landscape (UD, 1967, 17–21), a process that went on for several years after 1751.[3] Maps were also made during this process, as documentation of the border markup process, to be used in the future maintenance of the physical border. The border markings in the landscape are regularly reconstructed and they are still clearly visible, as we can see in figure 7.5.

First, the treaty text was written and agreed upon. Then the text was used in the physical markup of the landscape. People were also present in

[3]The process is outlined in Eide (2013).

Figure 7.5: An example of how the border between Norway and Sweden is written into the landscape of today. In addition to cairns, the forest is removed eight *alen* (almost five meters) on each side of the border. Photograph from the Åsnes border crossing.

this process who had taken part in the previous studies, before the treaty was made. Then maps were made based on the actual situation in the landscape, not based on the textual descriptions alone. So the treaty text was used to create a situation on the ground, which was then documented in the form of maps. Not only was this the practice, this was how the work was planned, and the plans were described in the treaty itself. The governments did not just happen to end up using this method, they decided beforehand to use it. They understood the balance between the three media they were using: texts, maps, and cairns in the physical landscape.

Similar texts in need of the context of the landscape to be correctly interpreted are common for local borders as well. The old land register in Norway had no resources to establish borders, either in the field or otherwise. "The old land register included no inventory of borders or areas, neither in words nor on maps."[4] Nothing in the line of widespread mapping happened before the

[4]"Den gamle matrikkelen var ikke utstyrt med grense- eller arealsoppgaver, hverken i ord

nineteenth century.

If vector data represent instructions for drawing a map to be read and applied by a computer program, a survey certificate is an instruction to a group of surveyors to be read and interpreted in the field, possibly leading to a physical marking up of the landscape. The two texts are different in their relation to context: the vector data need no other context than a formula which can be used to interpret the co-ordinate system and the numbers, whereas the survey certificate will need the context of the landscape in order to be interpreted.[5]

Context in this particular case really comes down to the need for interpretation by reference to the landscape. The context of the landscape is whatever is visible or known that an interpreter at a particular moment chooses to draw upon; another interpretation may be different because another interpreter may choose differently. The difference between vector data and a survey certificate is well in line with the difference between this category and the next—that is, between fully specified textual descriptions and underspecified ones.

7.1.2 Underspecification

Seen from Schnitler's perspective, underspecification seemingly posed no problems. He described as much as he needed to, and trusted the reader's background knowledge and other sources to fill in the missing details.

However, my project does not primarily aim at understanding Schnitler, but rather at understanding how texts work, using **S1** as the object of study. Then it becomes interesting to study in detail how underspecification works, because it steers what can be said in texts. There are connections to the differences between maps and texts which made it practically impossible for Schnitler to make certain kinds of specification in the textual expressions he created, while making it very hard *not* to make the same kinds of specification when he drew maps.

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eller på kart" (Holmsen, 1966, 154).

[5]The landscape itself may not always be necessary, mapping tools with good spatial data can sometimes be used instead of the real terrain. In Blevins (2010), the paper trail from property transactions which took place in Connecticut in the latter part of the eighteenth century is used to reconstruct a property using digital maps in a GIS system. However, he did couple the digital toolkit with on-site exploration and archaeological evidence.

So the goal is not only to find out how much is actually said, but also what Schnitler did with his underspecified descriptions, and how general that might be. What happens then that does not happen in the fully specified situation? This is what we need to pay attention to, because that is where we might find the significance of underspecification. Why or under what circumstances would anyone think that a fully specified description is necessary?

Underspecification occurs when the geographical information read from a text can be expressed as several significantly different maps. It happens when directions such as 'east' or distances such as '2 miles' are used: lacking other evidence, a number of different spatial interpretations of the statements are possible. I use the following definition of underspecification:

> *Underspecification occurs when a verbal text describes a spatial phenomenon in a way which can be understood as two or more significantly different phenomena by a competent reader, thus, an ambiguity stemming from a lack of information.*[6]

A text can seem to be detailed and accurate even if it specifies very little. In Schnitler, a lake is typically described by its length, width, and general orientation. Rivers flowing in and out may also be mentioned. Such a description appears to the reader to be clear and quite rich, but it turns out to give us very few clues as to how to draw the lake. In order to draw it, we would have to decide on numerous questions about the form of the lake about which the textual descriptions are silent. Rectangles would be in line with many of the descriptions of lakes we find in **S1**, but no natural Scandinavian lake has such a form. A river between two lakes may be presented on the map as a straight line without contradicting the textual description, but this also looks rather strange on a map.

But this is all the text has to say, and quite deliberately so. Schnitler was well aware that it was neither possible nor necessary to be specific about exact

[6] 'Underspecification' as it is understood here operates at a different level from its most common use in linguistics, namely, for features omitted when their value can be predicted in phonology. There are, however, uses of the word which are more in line with my definition as well, see e.g. Nakashima and Harada (1996). They discuss the need for disambiguation of expressions which are ambiguous because of underspecification when the situatedness of the expressions is not clear, which is in line with my focus on context.

directions. He clearly had the same view when it came to other details of the landscape. It was not his goal to enable the reader to reconstruct the landscape based on the text alone. An intended reader of the text would have access to other sources of information as well, including his own knowledge.

A similar point is made by Pelling when he argues that seemingly accurate descriptions of battles in Caesar are actually both simplified and wrong (Pelling, 1981). It is clearly a matter of what needs to be included in a text. What people already know or what they can easily find on a map can be excluded. So can what they do not need to know. The former reason for omissions is stronger for Schnitler, whereas the latter is more important for Caesar. What remains for both is that a text can seem to be detailed and accurate even if it is neither; it is underspecified. Caesarian descriptions are also commented on by Kraus with reference to a wall in Gaul: "[I]n its apparent clarity but actual difficulty of reproduction, the description renders the wall useless because practically unbuildable" (Kraus, 2010, 47). The description of the wall is meant to work as literature, not as a building instruction.

Evidence from my experiments indicates that underspecification is very common. None of the text fragments from **S1** studied in part II contains all the information needed to make one and only one map representation. There is always a degree of underspecification. The degree varies, though. If a text contains no spatial information at all, then any map can be said to represent it, but we would usually say that no map does so, not even a blank map.[7] Blankness on a map is an explicit statement about what the cartographer cannot or will not say. Therefore, a fully blank map is absurd in a way similar to John Cage's composition *4'33"*, in which a piano is not played on for 4 minutes 33 seconds.[8]

There is a sliding scale from fully specified textual descriptions to the absence of any description. Strictly speaking, there is always a level of underspec-

[7]Blank maps do actually exist, however rare they may be. One example is *USGS Rozel Point SW, Utah, 2001*, covering an area which is all part of the Great Salt Lake in Utah, USA, as discussed by Monmonier (1996, 132). Such maps are curious, but of no interest to this discussion, as they cannot be said to represent a text which contains no spatial information.

[8]There are other interpretations of Cage's piece, e.g., that for that time the composition is of all the sound that happens in the auditorium. However, the absurdity of the piano's and pianist's presence remains.

ification. Two maps can always be made which are slightly different, even if they appear similar to the reader. For example, small adjustments in location are routinely made in cartographical work in order to improve the readability of the resulting map. The purpose of using the concept 'significant' as outlined above is to clarify that we are not talking about such minute differences, nor are we talking about symbology. Map symbols can be replaced without its resulting in significantly different maps.

The relationship between implicit and explicit is being played out differently on the map than in the text. On the map, the spatial relationships between places follow implicitly from their being parts of a common geometry; in the text, the fact that there are accurate geometrical relationships between specified places on the ground is implicit. In order to be quite clear about the level of the differences between text and maps in regard to the level of specificity, and how this leads to differences in underspecification, I will here show how it works at the basic level of two spatial objects which are located relative to each other.

In most texts, distances are inaccurate, and directions even more so. We saw that the most detailed way to express directions in **S1** is in a system of 16. Each such direction covers $\frac{1}{16}$ of the full circle, or $22\frac{1}{2}^\circ$. On the map, the directions are expressed quite differently. Two places shown as points on the map have an accurate geometrical angle between them which can be expressed as a single number, as figure 7.6 shows.[9] For continuous lines and polygons, the angle between two objects can be expressed as two numbers, as we see in figure 7.7.[10] Such accurately specified angles are rare in natural language texts.[11]

The explicitness of other spatial relations is also expressed differently on maps. Relational statements as they are found in the text (e.g., "part of" and "north of") are not expressed explicitly on the map, they are only implicit. Not only that: they are not explicitly *expressible* either.

This explains how information is inevitably lost when we go from text to

[9]There is some inaccuracy because points on maps are graphical representations covering small areas. But this inaccuracy is insignificant compared to the ones we find in texts.

[10]Discontinuous objects would add complexity to this model, but it would not change the principles. The two numbers α and β in figure 7.7 define an exact span and must not be confused with the room of possibilities visualised in figures 7.8 and 7.9 on page 206.

[11]In the languages relevant to my research, that is. See Levinson (2003) for a broader picture.

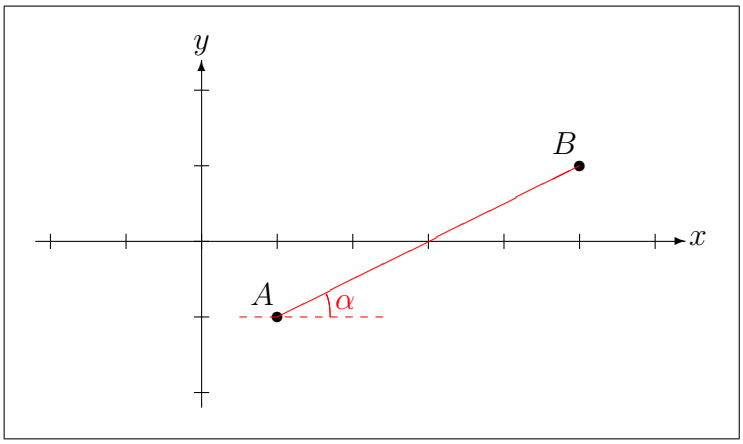

Figure 7.6: Spatial relationship between points as it is expressed on a map. The angle α between them can be measured precisely.

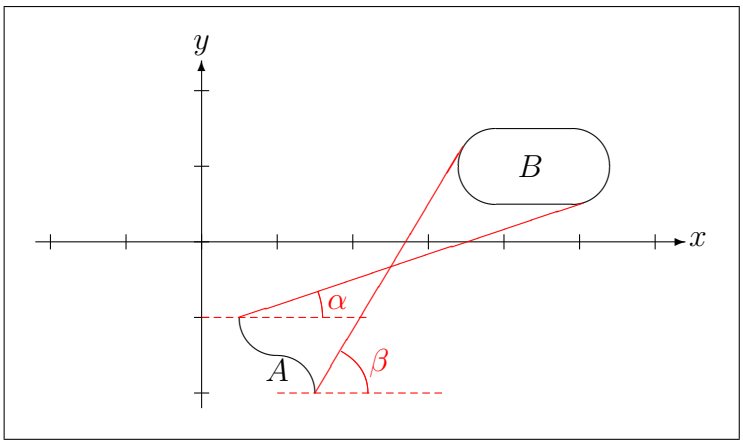

Figure 7.7: Spatial relationship between a line and a polygon as it is expressed on a map. The span of angles α–β between them can be measured precisely.

map. The expression "A is related to B with an angle somewhere in the area from $11\frac{1}{4}^\circ$ to $33\frac{3}{4}^\circ$" contains less information than the expression "A is related to B with an angle of 14°", but it also contains more. The relationship in the textual expression is explicit and can easily be typed. In order to express such a relationship on the map, it has to be turned into a spatial object and inevitably becomes part of the landscape. Further, to add precise information is to remove vagueness, and vagueness is also information. When such vagueness cannot be retained in maps, information is inevitably lost. The meaning of the text lies partly in spatial vagueness, a vagueness that has no place on a map, whereas

the precise spatial relationships needed by the map are not to be found in the text.

Gibson claimed that not all knowledge can be put into words, that one will always see more than one can say. Thus, one can argue that texts as well as maps will always only convey a subset of what is experienced.[12] In reference to a perceived cat lying on a mat, he claims:

> "The so-called concepts of extension, of far and near, gravity, rigidity, horizontal, and so on, are nothing but partial abstractions from a rich but unitary perception of *cat-on-mat*. The parts of it he can name are called concepts, but they are not all of what he can see" (Gibson, 1986, 261, italics in original).

Gibson was writing about the perception of the environment, but the claim is relevant for maps and texts as well, because the parts of what we see that are expressible as text are different from the parts that can be expressed as maps. The different media can express different parts of our perceived environment. As users of language and of maps, we will tend to construe the environment differently in verbalisation than we do on a map. A single, definite map cannot be made based on a text because the text specifies different aspects of the environment.

7.1.3 Disjunction

A text can be either spatially coherent or spatially incoherent. The case of disjunction we studied in chapter 6 was shown to create an incoherent text. A spatially coherent text is a text based on which one map can be made, once the decisions discussed above are made. A spatially incoherent text cannot be expressed as one single, static map.

Incoherence can be either explicit or implicit. Examples of explicit incoherence include the case where different spatial realities were attributed to

[12] Different people also see different landscapes when they look at the "same" thing. What is expressed, in text or map, is a subset of something more extensive. This 'something', which is available from our minds in ways we are not able to specify in full detail, is beyond the scope of this thesis.

two groups of witnesses, summarised with "Amber or Baanes Mountain" in the heading.

How would one proceed in order to express *either/or* on a map? One could include the fact that two items on the map have this relationship as a text on the map. Schnitler could have done so on his map.[13] The viewer's immediate understanding would still be that both of the objects of choice are located in the landscape as indicated by their locations on the map—in our case, touching the border. The reading of the text on the map could only eventually change this impression. While reading the textual version in Schnitler's aggregation, on the other hand, in which the heading of the description reads "Amber or Baanes Mountain", the idea of both mountains being border mountains is not established in the mind of the reader from the outset, as the word "or" immediately establishes the fact that there is a choice between the two.

In the border negotiations, maps were made with contested areas marked out.[14] These maps show areas which have the properties of being matters of dispute in the negotiations, rather than areas which are either part of Norway or Sweden. The medium of the map pushes our interpretation in the former rather than the latter direction. I will not claim a definitive inability of maps to express disjunction, but the medium clearly makes it hard to do so, and also hard for the map user to understand what is meant if such an attempt is made.

7.1.4 Negation

Negative data can be expressed explicitly in a text, something of which we saw examples in part II. They are harder to express on maps. A first intuition is to express explicit nonexistence as a blank area on the map. But the expression of nothingness following from blankness on the map does not in itself say that no particulars of a certain class (e.g., no farms) are found. It is a different expression of nothingness. When a blank space on a map says "nothing here", it implies "no thing of any kind of interest". Everyone knows there are things there—if nothing else, rocks and vegetation. In a text, one can easily type the

[13]The relevant part of his map is reproduced in chapter 1.

[14]One example is a map by Knoff and Knoff with contested areas visualised (National Archives of Norway in Oslo, map number 49), cf. **S1** (xviii-xix).

negation: "no farms here" says nothing about the possible existence of other things, such as lakes.

Typing is possible on maps as well, but the options are more restricted. This is connected to the limited vocabulary of a map. Many maps include legends listing, if not all the symbols used, then at least the most important ones.[15] This can be seen as the vocabulary of the map. Similar vocabulary lists are very rarely published with texts.[16] The potential vocabularies of texts are limitless because of the productivity of language.

On many large-scale topographic maps, a lack of blue lines expresses "no rivers here", defining "river" as being of a certain size and permanence. A lack of brown lines makes the claim that there is no elevation over 20 meters, or whatever the equidistance may be, in an area. But maps in which a lack of house or farm symbols has the general meaning of "no farm" are rare. A text can say that something is not there for any number of object classes, whereas a map can only say so for a limited number of object types in a limited number of situations. Thus, texts may contain information that goes beyond what a map can express.

Negation is closely connected to counted numbers. The statement that an area has eight farms is difficult to express on a map, and the difficulty is similar to negation. That is, modelling the eight farms is fine, but the implicit statement claiming that there are no ninth and tenth farms is difficult to put on the map.

7.1.5 Impossible figures

The concept of impossible figures is more difficult and harder to understand than ambiguity and negation, and I found no evidence for their presence in the experiments. This was quite surprising, because when I started the project I saw it as the clearest candidate for a phenomenon that would make the process of creating maps based on texts difficult. I will focus on two possible

[15] See Wood et al. (2010, 67–72) for a critical view on the map legend.

[16] A possible exception is special purpose publications such as easy readers for language learning. Concordances are made for many texts, but their purposes are different from those of map legends.

explanations why I did not find any situations which led to impossible figures. One is that my modelling was not a feasible way to find them, for example because it was not extensive enough. The other possible explanation is that they do not exist.

I have not found any examples of impossible figures during the experiments. Can they be found at all using my methods? Could it be that larger, more complex models would give evidence for them? It would be interesting to study this in more detail. Possible future research in that area will be discussed in chapter 9.

It could also be that the pragmatics of language prevents impossible figures from arising. When a space is described differently in a verbal text from how it would have been described on a map, this is connected to the interpretation of the words and sentences, which in its turn is based on how the human mind envisages space. One often feels that the way onward to a place is longer than the way back to the starting point (Brodersen, 2003, 57). If one expresses this experience in a statement, it will not normally imply a claim that A to B is actually longer than B to A.[17]

Further, even if the experience and description of a walk from A through B and C back to A may include in its triangle shape two right angles, which is impossible, a statement about the walk will not normally include the claim that the triangle described by the travel actually has two right angles. There are two reasons for this. First, such a description is not meant to be accurate in a geometrical sense. The meaning of the expression 'right angle' is not always 90°, and the roads we walk are not always straight. And second, on the side of the receiver, the pragmatics of language would add another round of consideration. When something 'impossible' is uttered, the listener sees the absurdity and looks for alternate meanings (Grice, 1989, 27).

When the response from a listener is uttered, this feeds back to the speaker as a tool to be used in order to understand how new statements can improve understanding. These considerations, combined with the fact that I have found no examples of such impossible figures in Schnitler, has led me to suspect that

[17]More examples of similar phenomena can be found in the psychological literature, see Tversky (2005) for an overview.

this group, however obvious it may seem on the surface, does not really exist, or is very rare.[18]

Negation and disjunction make up parts of the meanings of certain expressions. The model based on the disjunctive paragraph was spatially incoherent; in a sense, the paragraph is spatially impossible. Maybe this is what impossible figures come down to: statements which do not add up when taken together. Maybe the closest we get to impossible figures is disjunction. It could also be that the difference between disjunction and an impossible figure is that the former represents an explicit incoherence, and the latter an implicit incoherence. Or maybe my thinking around the concept is wrong because the concept is too subjective: what for one reader is impossible is for another just a peculiar expression.

7.2 Maps can still be made

Maps cannot be made based on information from a text without significant loss of meaning. If we accept such loss of meaning, how can we proceed to make maps? How can the loss of meaning be minimised? In the case of underspecification, we saw that maps can easily be made once the choices are made. In order to express more than one set of choices, multiple or dynamic maps can be made.[19] In regard to disjunction and negation, the situation is more complex.

There are ways to make maps in situations where we have disjunction. One can make two or more map images, one for each alternative, to be seen as parts of the whole. Ways to use dynamic mapping to represent ambiguity are conceivable. One example would be to have an image alternating between the alternatives. Such use of multiple or dynamic maps is different from the case of underspecification. In this case, different maps are made which in sum tell

[18]This may, however, be different in fiction. To take one example: it may be the case that the strange spaces in Ishiguro's novel *The Unconsoled* (1995) may be understood as impossible figures; still, it is a question how interesting such a reading would be. Would it really add anything which is not obvious to the understanding of the novel?

[19]A dynamic map is a map where the map image can change, often connected to user interaction. They are almost exclusively made in computer systems.

a complete story, whereas in the case of underspecification, each map tells a complete story, but only one of the possible ones.

Negation may be expressed for a limited number of categories on one specific map, but only if a definition exists under which completeness is feasible. For an area with very little building activity, one can have complete coverage of houses on a large-scale map for a period of time, giving the user an option to read out negative information: no symbol on the map means no house. This is impossible for a smaller-scale static map, covering, say, a county.

A general solution to all these problems is to include on the map a text explaining the situation to the map user. This solution will work for all cases, but it will turn the part of the map in question into a document where the geometry of the landscape is no longer expressed fully by spatial similarity with the map. It turns, so to speak, the map into a text—at least at certain points.

As we remember from part I, a topological map is a depiction of spatial features where scale is not represented and directions are altered to make a clear visual image; an example was presented as figure 6.17 on page 183. While a topographical map follows the map definition from page 31, topological maps are not maps according to such a definition. The fact that the hypothesis is supported is also based on this definition; it is clear that a wider definition of 'map' could have given a different result. Specifically, topological maps are spatially vaguer than topographical maps and can express more "text-like" information—for example, when networks are described in a text. Disjunction and negation are problematic in similar ways for a topological map and for a topographical one. But what about underspecification?

The route description example above showed a situation where topological maps are closer to texts than topographical maps are. Other than that, the use of topological maps has not been studied in the experiments. Topological maps, with their special relationship to networks, can be envisaged as a possible middle layer between texts and maps. They express explicitly something that can also be expressed explicitly in texts, namely network information, while still being graphical. This possibility will not be investigated further here, but we will come back to route descriptions and topology in chapter 9.

In the graphical presentations made in section 6.1.2, one map was created for each set of choices of the underspecified values. What if no such choices were made? What if the model's openness was translated into a geometry? A figure based on such a geometry is not a map. Can it still be useful? The thinking presented here is based on a system developed for the purpose of modelling time, called *Holmen/Ore calculus* (Holmen and Ore, 2010).[20] Space is more complex to model in this way than time is, and I have not tested any implementation of what is speculated upon here.

My original, naïve plan for creating a map based on the text, in which I exchanged each direction with a number (e.g., east becoming 90°), represented an incorrect reading of the text. A more correct reading lets each direction represent a span of possibilities.[21] Given a text stating that B is 1 mile east of A, a figure could be made where B would be represented by the curved line which is the $22\frac{1}{2}^\circ$ sector of the circle with A as the centre and 1 mile scaled down to, e.g., 10 centimetres as radius. But a curved line is not enough. The length of the mile is not known. 'Mile' may have different meanings, and no measurements at the time and place were accurate. If we say we know it to be no less than six and no more than ten kilometres in this specific example, we get a sector of possibility for place B. This is illustrated in figure 7.8.

If we have a new point C 2 miles to the south-east of B, new sectors would have to be made from each point on the sector representing the possible location of B, as shown in figure 7.9. Such geometrical models would soon become quite complicated. They can be created mathematically, and they could be expressed as figures, but such figures would not be maps. The use of an area to represent a possible location of a place is contrary to how maps work.[22] Such rooms

[20]Holmen/Ore calculus is based on time modelling mechanisms in CIDOC-CRM, with strong links to Allen operators (Allen, 1983).

[21]This may reflect what Gibson (1986, 68) calls 'visual angles' in reference to people's wayfinding, that is, it is based on how an observer sees the world. While the angles change with movement, the components of the earth (mountains, lakes, trees) do not change in size. Of course, everybody involved in the border work knew this; probably not explicitly, at least not in similar words as the ones used by Gibson; still, they "knew" it as part of their practice.

[22]There are people who try to develop symbols for uncertain locations. The Pleiades project uses cloud symbols to represent places from antiquity which they only know the rough location of. But the symbols only indicate uncertainty, they do not present polygons defining the largest possible areas in which places can be located. Project webpage:

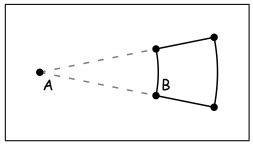

Figure 7.8: Underspecification 1: From point A, the connected point B can be anywhere in the sector.

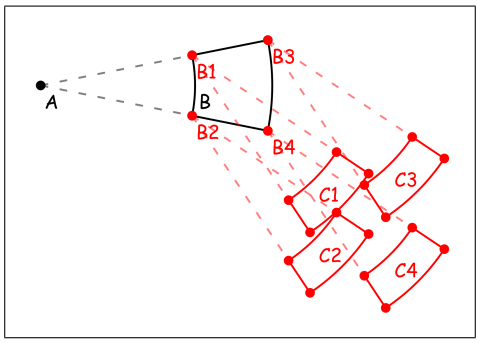

Figure 7.9: Underspecification 2: From point B, the next point C can be anywhere in the area made up by the set of sectors created from $B_1, B_2, \ldots, B_n$. Four examples are shown.

of possibilities are used for thematic mapping, not for mapping topographical features.[23]

The evidence from Holmen and Ore (2010) shows that when new facts are added, uncertainty is reduced in the system.[24] One could assume something similar happening for space. As new data are added to these geometrical rooms of possibility, it is quite likely that added place references will link back to places mentioned earlier, and this may reduce the possible area in which a place can be located, thus reducing uncertainty. As we will see in chapter 9, this method implemented dynamically in software would allow the historian to explore multiple possibilities of how and where a landscape described in historical sources may have been located.

7.3 The question of context

On page 190, the categories *fully specified textual descriptions*, *underspecification*, *ambiguity*, *negation* and *impossible figures* were presented. How would these categories look if we formulated them in the context of a pre-existing

http://pleiades.stoa.org/ (checked 2012-04-13).

[23]MacEachren (1992) is an early example of mapping of uncertain thematic information. Some attempts are also made in virtual reconstructions of historical buildings and sites; references to examples can be found in Koller et al. (2010, 12).

[24]The reduction of uncertainty is depending on if and how the new facts relate to the previous state of the system, as outlined in Holmen and Ore (2010).

map—that is, if we put the information *onto* a pre-existing map rather than expressing it *as* a new map? The typology was based on the pretence that I knew nothing about the landscape described in **S1**, except for the descriptions in the text itself. I pretended not to have seen any map and not to know the area, or even general features of Scandinavian landscapes. I pretended not to know most of the context. What if I move back to a normal way of reading?

The question of context was raised several times in parts I and II and has been discussed at different levels. I will here analyse it anew based on evidence from the experiments. I will focus on the narrow and visible context rather than the wider context discussed by Hirst (2000). The aim is to clarify how the context in which references to spatial features are used influence how they work, and how this plays out differently in maps as opposed to texts. But first I will digress by telling a story about pre-digital map making based on landscape surveying. It is based on personal experience from the mid-1980s, and the resulting map is Eide et al. (1986).

When a group of which I was a member set out to make a new orienteering map for an area in Eastern Norway in 1986, the task included extensive field surveying. We recorded our results as pencil corrections to a base map, which was our main tool in the field. Base maps were made on the basis of double sets of aerial photographs. Using a stereoscope, the base map constructor would see a three-dimensional image of the landscape. He would draw all relevant information that could be detected from the aerial photo onto the base map; what he could not see was obviously not drawn. One example is that the crossing of a creek by a road would be recorded accurately, whereas the stretches of the creek between such crossings often would not be, because of vegetation.

Creeks in the landscape types in which we were working are often covered by thick bushes of a certain size, so that the constructor sees the bushes, knows the creek is there, but does not know the details of the creek. When mapping out the creek during a survey, the technique we used was to start from one of the fixed points, to try to define straight stretches, and then to measure the angle using a compass and the length by counting footsteps. This is difficult to do accurately in thick vegetation, of course, so once I reached the next fixed

point, there would be a discrepancy in the map sketch. This was corrected with pencil and eraser by stretching and moving, keeping the relative relations between the angles and lengths.[25]

This example shows two things. First, context is always needed, and can be very narrow; it can be the spatially known places around the spatially interpolated places. Second, establishing a map based on landscape is fundamentally different from establishing a text based on landscape. Similar processes would not have been necessary, or even possible, if I had been writing a text. A text will mention the fixed points, the general direction and degree of straightness of the creek, but not every turn, and the stretching process would be meaningless. On the map, more choices have to be made. The places have to be located in spatial relationship to each other.

This difference is clearly connected to how each map symbol relates to the other symbols around it, as opposed to how a clause in a text relates to other clauses around it. It is connected to the narrow context. Internal context operates differently in texts and maps. Links between specific places described in the two media will be links between different internal contexts. A place name in the text has a textual context, and the place name on the map has a spatial context.[26] But through my modelling and the creation of maps based on the model, either is also included in the explicit context of the other; contextual links are stored in GeoModelText.

How is this done? Each part of the primary model established in the experiments is connected to the source text at the word or paragraph level. There are links from the primary model through the stepwise formalisation all the way to the vector data and to the maps. These series of links can be followed back from a map to the source text on which it is based. So there is a close connection between each detail of the model and the source text. This gives text-based evidence for the conclusions, but not only that. It also gives the

[25]Today much of this process is automated, especially the measurement of the whereabouts of the surveyor. This does not remove inaccuracy per se, but it may be reduced to a level where it can be neglected at the scale of the resulting map, which means that the inaccuracy no longer exists in the context of the map.

[26]As we will see in chapter 8: also a text has spatial context. But in the text studied here, this is not connected to the meaning in any way similar to what it is for maps.

internal context of each textual feature linked to the model. As the model is linked to the tags in the text, the context is always already there.

But can such a context be used? It can be reconstructed, but it cannot be included on the map. The map creates its own system of context, based on, e.g., spatial proximity and similarity between symbols. So the contextual link through the model to the source text is a link out of the map, different from links to other place representations within the map.

Each utterance in **S1**, as in any text, exists in a context. The context operates at several levels and cannot be fully specified. Context can be divided into two prototypical groups, existing internally or externally to the text.[27] In my experiments I have not eliminated the context, but I have gone to significant lengths to reduce as much as possible the text-external context I take into consideration.

In the more common ways of reading a text such as **S1**, different strategies are followed, in which necessary and relevant contextual information is included. In such readings, the text can be mapped without much trouble, even if the task may be quite time-consuming. This is routinely done for fiction as well as nonfiction.[28] One creates a new map representing a reasonable understanding of the text by adding information from the text onto a pre-existing map. Some places will not be identified at all, and some only by interpolation from other places mentioned in the text,[29] whereas many will be found on the maps used. In this process, much information which is external to the text—that is, which is included from the external context—is taken for granted.

I assume this to work according to Ryan's principle of minimal departure. In order for this principle to apply, the reader must be able to make some association with a previously known world when she reads the text. Once a text and the reader's knowledge of a landscape are connected, the principle

[27]This distinction will not, I suspect, stand up to detailed scrutinising. But is serves my purpose as a general rule of the thumb.

[28]Many examples can be found on John Levins' blog posting *Anterotesis: DH GIS Projects*, URL: http://anterotesis.com/wordpress/dh-gis-projects/ (checked 2012-04-12).

[29]An example of such interpolations is described in detail for a slightly earlier text than **S1** in Schmidt (1983).

explains how we read our way into the landscape—or rather, into our knowledge of the landscape:

> [T]he "principle of minimal departure" ... states that we reconstrue the world of a fiction and of a counterfactual as being the closest possible to the reality we know. This means that we will project upon the world of the statement everything we know about the real world, and that we will make only those adjustments which we cannot avoid (Ryan, 1980, 406).

In order to understand better how context works, another typology is included here as a contrast to the one we saw on page 190. This new typology describes the normal way of seeing the relationship between text and map, intended not to create a new map based on a reading of a text alone, but rather to express information read from the text onto a pre-existing map.[30] The latter process involves adding a significant amount of contextual knowledge to the process through what is learned from the pre-existing map.

1′. **The match.** *The text fits the map without ambiguity.*

This should be the case for travel guides; at least one would hope so. Many descriptions in realistic novels will also fall into this category, taking the principle of minimal departure into consideration. Most parts of **S1** will end up here.

2′. **The unspecified map.** *The text includes too little information to enable the reader to relate the described places unambiguously to the map.*

This may happen if too many of the place names are not found on the map. A text describing an unnamed landscape may also fit here. In the case of **S1**, unidentified place names may push fragments of the text into this category.

3′. **Ambiguity.** *I assume this category will work similarly here as in the "as map" situation.*

[30]Normal in the modern Western culture, that is. We have no indications that this would be normal for a Sami reindeer herder in the eighteenth century or for other people in other times and places.

4′. **Negation.** *I assume this category will work similarly here as in the "as map" situation.*

5′. **Impossible figures.** *Impossible figures could be the result of using the wrong map.*

What if the text does not fit the map, that is, if we are not able to put the places on the map because something does not fit? This could mean that we have the wrong map. To try to map onto a normal map of England a description in which someone travels to the south from London and reaches York would be an example of this situation.

There is a difference here based on the number and severity of issues: the more problems faced, and the more severe they are, the more likely it is that the map is not the right one; the fewer and less severe the problems, the more likely it is that the problem is one of inaccuracy.

The problem of underspecification is not really solved even if we have a map to start from; rather, it is hidden. The same choices are made when one starts from a pre-existing map; however, they are made based on and in accordance with the map.[31] So the map will define a spatial reading of the text. Another map could lead to a different reading. The problems are highlighted when we are faced with places we cannot identify. We have no way to put those places on the map. They will then rest in their own map layers, similar to what we saw in the "as map" situation.

The choice of one set of interpretations of the text is made when the base map is chosen. As one map based on a text can be significantly different from another map based on the same text, readings of texts can also be pinned to significantly different pre-existing maps. A text cannot be interpreted as representing information in conformity with any map, but the maps can be quite different.[32]

[31]Being in accordance with a good map tends to be seen as being in accordance with truth (Monmonier, 1996).

[32]In map based orienteering I have often experienced a moment of revealing truth. I have thought I have been following the map for a while, but then, suddenly, I understand that I have been on the wrong track. Unknowingly I have been stretching and interpreting the map to fit the landscape, and my view of the landscape has been adjusted to fit the map.

Further differences between texts and maps are linked to specific types of spatial features. Mountains are very difficult objects to pin down to geographical ontologies.[33] They are, however, easy to discuss in texts; they do not seem to be problematic at all in **S1**. This may be related to the fact that a text needs no explicit borders, whereas on a map the potential for borders is always already there.

The most detailed topographical map data covering all of Norway are held by the Norwegian Mapping Authority.[34] In the digital vector data on which the maps are based, there are identifiers of spatial objects for some types of places. For roads and municipalities, to take two examples, the vector data from the mapping agency will connect the lines or polygons representing the spatial objects to data specifying, for example, road type and number; and municipality number and name.

Similar information is not included for objects such as rivers and mountains. There is no link between a set of water polygons and a river name or identifier, and there is no connection between a mountain and any polygon at all. A mountain is recognisable to a map reader by the contour lines or the shading in the vicinity of the name of the mountain on the map image constructed on basis of the vector data. There are no polygons defining the outlines of mountains or rivers. The place names are not connected to river or mountain objects in the same way they are for municipalities or roads. They are connected to spots on the map—not the location of each letter, but a point close to which the name as a whole should be located.[35]

This is partly a consequence of lack of investment by the mapping agency, but only partly. While there may be ways to identify the polygonal outline of a river, this is not possible for mountains. Few mountains have definite borders.

Then everything falls into place and I realise I am not where I thought I were; that is, my location in the terrain is referenced by a different spot on the map from the one I thought it was, and my recent journey followed a different line on the map from the one I thought it had.

[33] In their discussion of the ontological status of mountains, Smith and Mark (2003) opens the possibility of seeing mountains as affordances in Gibson's sense.

[34] Kartverket, webpage: http://www.statkart.no/ (checked 2012-04-12).

[35] Placing names on maps in an aesthetic and functional way is a complex matter into which I will not venture in this thesis.

This is not a question of uncertainty, because "exactly" measured data such as the borders of lakes and the height above sea level are also based on partly arbitrary choices; for instance, where the limits of a lake are depends on what water level is taken as the baseline situation.

Rather than uncertainty, what I am aiming at is a difference between situations where the average map user expects to find an explicit border, such as for a lake, and when not, as for a mountain. It is socially accepted to claim that a lake ends somewhere, even if it does not end exactly there much of the time because of varying water level. It is socially accepted to put a line delimiting the lake on the map, at least when the other side of the line is dry land. It may be more difficult to specify where the lake ends and the river begins, and it is normally not socially acceptable at all to define exactly where a mountain ends.

Similar problems just do not arise for textual descriptions, because textual context is not spatial in the same way. However, texts have problems of their own. Places may not be identified. But once a place is identified and put on the map, spatial relations to other places as they are expressed in the text are no longer relevant. No geometry will be impossible once the information is mapped, because at that stage, the data fit a geographical map per definition.

7.4 Conclusion

In this chapter, it is shown how the hypothesis was supported and some categories of information types that are problematic in the process of mapping textual information are established. I have also discussed what the consequences may be if one proceeds to create maps based on textual information, and I have outlined some general ideas about the relationships between maps and texts. In order to develop this further, I will now turn to broader theoretical landscapes.

Chapter 8

Beyond Schnitler

Chapter 7 showed how my research supports the hypothesis; maps cannot be made based on fragments from **S1**—short texts—without significant loss of meaning. Does this result have any implications beyond the source of the experiments? **S1** contains many descriptions of landscapes, based on many different people's views. If any text gives evidence that can be generalised, this one is a good candidate. In this chapter, the general applicability of the results will be investigated through the discussion of a stronger hypothesis.

8.1 The stronger hypothesis

We are not only talking about specific types of geographical information which cannot be transferred from one specific text to a map, but also about general characteristics of texts, characteristics which are highlighted when texts are compared to maps. I will show that similar problems in media translations are well known, even if they have not been studied much for maps. To guide me in this work, I have made a new hypothesis which is a generalised version of the original one and thereby significantly stronger than what I have shown so far:

> There are texts from which all geographical information can be expressed as one single static map, and there are texts from which it cannot. But there are no texts in natural languages based on which a map can be made without making choices with significant

> consequences; thus, it is impossible to make a map from a text without adding and removing information.

The stronger hypothesis will be investigated through a comparison between the two media. First I will outline what kind of image a map is, and then I will develop a general understanding of its relationship to texts by going through some possible types of relationships between the two. This brings us a step further, but it does not give the answers we are looking for. However useful these comparisons may be for practical purposes, they are rather superficial. They do not explain the findings summarised in chapter 7 at any level of detail, and in order to evaluate the stronger hypothesis we need to get to the details of how the two media relate to their objects of reference.

In order to get deeper into the theoretical implications of the results, I will connect to a long tradition of comparisons: that between painting and poetry, known as *Ut pictura poesis*. This will give some basic understanding of how the two art forms are experienced in different ways. After some remarks on antiquity, I will focus on a seminal work written just after Schnitler died, Lessing's *Laokoon* from 1766. From that I extract two oppositions which are useful also for understanding the relationship between texts and maps.

Then I will briefly mention ekphrasis, the tradition of describing a visual work of art in text, and use it to understand better the differences between reading a text and reading a map. After that, I will classify maps and text in a system recently developed in Elleström (2010) and show how his system can be used to generalise the distinctions I established based on Lessing. This will be used as a basis for a renewed discussion of the relationship between texts and maps, which will conclude with an evaluation of the stronger hypothesis.

This chapter will focus on Western written culture, the culture Schnitler came from and also the culture from which stemmed the written education imposed on the lower classes. An inquiry into applicability for other cultures is most desirable, but will not be given here.

8.2 What kind of image is a map?

In chapter 2, a definition of 'map' was offered, together with a short outline of the history of cartography. In this section geographical maps will be discussed as a type of image. What kind of image are they?

When we look at a map, we see symbols spread out on the space of a document, on paper or on a computer screen. In seeing the document as a geographical map, we expect the symbols to be associated with objects in an external space represented by the map. For topographical maps, the external objects will be in an existing terrain. Even though the main function of most maps as they present themselves to the viewer is referential, other criteria are also used to select what is put on the map and where it is placed, including legibility and aesthetics.

Maps are made up of signs. However, map signification operates at two different levels, intrasignification and extrasignification. Each symbol on the map is a sign, but the map as a whole also works as a sign.[1] While the intrasignificant codes are exploited by maps, the extrasignificant codes are the codes by virtue of which maps are exploited (Wood and Fels, 1986).

At the level of intrasignification, maps operate as bridges between types and particulars. Each symbol on the map asserts an equivalence between a conceptual type and a location on the map. Because this can be read by a map user as the statement "This is located there," it also connects to one particular thing. But not only a particular; as an instance of a type, the cartographic sign on the map image also represents the type. In the legend, the particulars are absent; there the cartographic sign represents only the type, not any instances of it.

Map semiosis can be divided into three dimensions:[2]

Semantics: The relation between sign-vehicles and referents (objects of reference), operating on the individual sign level.

[1] This is in line with the events discussed in part II, which are connected to maps in two different ways: either the event can be connected to one of the symbols on the map, or the map as such can express the descriptions made in one speech event.

[2] This is based on map semiotics as it is developed in MacEachren (2004) and Brodersen (2005). Their semiotic systems are based on Peirce. What we usually see as a map symbol is called 'sign-vehicle' in order to avoid confusion with other uses of the word 'symbol'.

Syntactics: The relation between a specific sign-vehicle and other sign-vehicles.[3]

Pragmatics: The relation between sign-vehicles and interpretants (concepts), operating on the individual sign level.

So semantics is about the relationship between each sign-vehicle (each graphical symbol we see on the map) and things in the real world referred to by the map—for instance, the relationship between a black dot and one specific boulder. Syntactics refers to the relationships between two or more sign-vehicles as we see them on the map, such as the relationship between the black dot and a nearby black line which semantically may represent a specific physical road. Pragmatics is the relationship between the sign-vehicle we see on the map and concepts we think and communicate about. The idea of a boulder may be very clear for an orienteerer with experience in using maps where such sign-vehicles are often used, whereas a map user whose experience comes only from city maps may have only vague ideas of what 'boulder' may represent in the context of maps.

The sign-vehicle functions as a mediator between thing and meaning, e.g., between a specific boulder in the landscape and the concept of 'boulder'. The context for the interpretation of a sign-vehicle is the map schema. Map schemata are possessed by humans and are used to understand the intrasignificant signs on maps (MacEachren, 2004, 198).[4] The principles behind such schemata are in line with the principles of the map definition from page 31, although the concept of map schemata is specifically used to understand how we read maps. In addition to general map schemata shared by many if not all people, specific groups such as orienteerers may share more specific map schemata.

Texts are integrated parts of the map image, often in the form of place names. Texts are also used in the perimap outside the map image, for example,

[3]There has been a discussion if maps have syntax or not, cf. Head (1984) and Robinson and Petchenik (1976). According to MacEachren, syntactics is different from linguistic syntax in that syntactics is not connected to a linear sequence.

[4]The claim that such schemata are actually possessed by humans is disputed (Ingold, 2003, 53). However, the concept fits well into MacEachren's broader system, and I will follow his use of it in this thesis.

as common nouns connected through the iconic/symbolic form of a map symbol in the legend. While place names represent particulars, common nouns in the legend represent types. The string 'road' next to a black line in the legend shows the map user that such black lines represent the type 'road'. The string 'A 24' on the map image next to a black line shows that this particular road bears the identifier 'A 24'.

The same sign-vehicle can be both indexical and iconic, and also can have some symbolic signification on a map, either as such or through the text linked to it. Texts are not needed for particularisation; the fact that a sign-vehicle is located in the map image already shows that it represents a particular feature. The particular feature is always already located; a map is not just an image, but an image behaving like a topological diagram. It is the location of a symbol on the map that confers its indexicality and its particularity. Texts on the map, when present, take part in the particularisation process by showing the name of a particular.

There is a pictorial-associative-geometric continuum from mimetic to arbitrary. Most maps signs are not pure symbols; they also have iconic traits, or degrees of iconicity. Space standing for space is one of the ways a map can be iconic, but not the only one. A sign can be iconic in different ways; although size may represent size, as when the symbol for a city represents the area of the same city, size can also represent population. In the latter type of mimesis, space is not standing for space, but rather for numbers of people, for instance when one type of circular symbol of a certain size represents cities with a population between 100,000 and 500,000 people (MacEachren, 2004, 258).

Maps are special because they juxtapose highly motivated (mimetic) and highly conventional (abstract) signs. An example of this is that a map can use space in accordance with the general map schema to represent space, but it can also use symbols whose spatial characteristics have no correspondence to spatial attributes, such as a cross representing a church building. So they are clearly images, but images with a strongly formalised way of expressing references using a wide variety of signs and sign types.

8.3 Comparing maps to texts

What kinds of differences are there between texts and maps? What would a comparison between the two as different media types imply? Which perspectives can be taken on such a comparison? An extensive literature exists on the topic of comparing texts to images. Comparisons between maps and texts are rarer, in geography and cartography as well as in textual studies.

One type of relationship is to see the one as a norm for the other. An example of such an approach is found in Mondada and Racine (1999). They comment on the limitations of texts in their discussion of Soja's postmodern work on the geography of Los Angeles. A totalising vision is impossible and is

> replaced by a fragmentary and contradictory description which remains prisoner of the linearity of the written text. This critical remark regarding the possibilities of the written text is ancient: a first synthesis can be found in Lessing's *Laocoon*, which considers the opposition between the successiveness of poetry and simultaneousness of painting (Mondada and Racine, 1999, 273, italics in original).

This view is not uncommon. Texts are seen as a limited way of expressing geographical information. Jacob and Dahl (2006) are in line with this view. They do, however, present a metaphor of some interest. Maps are similar to libraries because both organise and codify knowledge (Jacob and Dahl, 2006, xix). If we follow them in seeing the map as a fragmented library spread upon a surface of representation, what are the implications? A library is not intended for linear reading; it is a room where books are placed in space based on some organisational principle. Each book is an independent object, and we may follow a different route each time we move through the library (Jacob and Dahl, 2006, 254–256). However, linearity returns when we open up one of the books and start reading. The library is a set of linear texts organised in a non-linear space.[5]

[5]The linearity of the text discussed here is at the basic level of reading. It is different when we consider the experience evoked through reading, by engagement of the synchronic

The comparison implies that each piece of information on the map contains a "book". This is true in the sense that stories exist and can be told in reference to places. In oral cultures these stories are known by people using an area. Based on written material, anyone can follow references from a place name through, say, an encyclopaedia to masses of information; in digital systems, one follows hyperlinks. However, a consequence of this view is that even if information can be connected to the map by a competent and knowledgeable reader, it is still part of the external rather than the internal context of the map. It is outside the map, even if connected to it.

The library is a metaphor of some explanatory power. However, I find the idea of the text as a limited version of the map deeply problematic. The two are rather different forms of communication which are both needed, and which both have their limitations. Narratives are useful; they are not just prisons one needs to escape from. Good writing is necessary in order to convey geographical knowledge (Sayer, 1989, 270–271).

Maps and texts should be seen as two systems which complement each other. Language and maps are used only by humans among all species, and they are used to communicate information to others. This is as far as the similarities go, according to Landau and Lakusta (2009). As for differences, they notice the roughly analogue nature of maps, providing a much better way of encoding spatial information than do texts. They also note that language is mastered much earlier than maps by most humans; on the other hand, humans from all cultures can master maps quite easily when this is tested. Their conclusion is that the significant differences between maps and texts is a good thing; combining them makes a very useful set of tools available to humans alone of all species. Maps and texts complement each other, and Landau and Lakusta's results

> suggest a specific mechanism whereby language could enhance humans' ability to reorient by strengthening a unified representation of geometric and nongeometric properties of space (Landau and Lakusta, 2009, 15).

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dimension of language, in the evocation of memory and eventually the overview of the entire text once it is read the first time. This will be discussed further below.

Accepting that the two media have complementary value highlights that they work differently, a view which is supported by my research. But it is not undisputed. Head (1984) claims that maps and texts are fundamentally similar, and that the process of reading either is based on pre-existing knowledge on the part of the reader, which is the same in both cases. In comparing the reading of maps to the reading of printed texts, he focuses on two arguments for their similarity. First, because of the continuous nature of maps, there are no smallest independent symbols. He argues, however, that contrary to common belief this is the same for spoken language, as the sounds of language are also continuous. "[M]ap 'symbols' are equivalent to morphemes" (Head, 1984, 9), so map is like spoken language, or languages written in orthographies such as Chinese characters.

Head's second argument relates to syntax and the lack of a pre-defined direction of reading in maps, which he claims also exists in text because the same deep structure can be represented by different word orders. Freedom in word order is of course a correct observation—for some languages it is quite extensive—but his argument still misses the linear vs. non-linear distinction which exists at the lower levels of actual expressions. Even if the truth value of two sentences with different word orders may be the same, the sentences may still be different at the pragmatic level. He claims to be discussing users of maps and texts and their expectations, but when we read a text, the order of the words is static. For a reader or listener, a sentence always already has a word order. Furthermore, alphabetic words are ordered sequences of letters, or, for spoken words, ordered sequences of phonemes.

As we will see in the next section, I claim that there is a fundamental linearity in oral texts, which must also be taken into consideration in order to read and understand written texts, but which is not present in the same way in maps and other images. Even if maps and texts are both experienced in time, the ways in which this happens are fundamentally different.

8.4 Comparing the arts

There is a striking imbalance between the comparisons between maps and text we have just seen and the results from the experiments in this project. For instance, I demonstrated that underspecification, disjunction, and negation are problematic, but these problems are not discussed in the comparisons we have just seen.[6]

The results from part II present a level of detail which is lacking in the comparisons. Another issue is the connection between the results from the experiments and the one historically situated text on which they were based. How can we theorise about the findings while still keeping a link to the historical and cultural contexts in which they were found?

Lessing's *Laokoon* provides a convenient, historically close and culturally quite similar response to the difficulty. It grew out of the same intellectual landscape as Schnitler lived and acted in. It allows us to approach a theory of the relation between texts and maps that makes explicit how Schnitler is likely to have thought about such matters. Lessing's rules still work, as is demonstrated not only by performances from then to now, but also by the scholarly discussion in the twentieth century. *Laokoon* is far from undisputed, but the positions we base on it are clearly defensible. Ekphrasis can also be understood in the light of *Laokoon*.

Elleström's system can be seen as a generalisation of central oppositions found in Lessing's study. It can explain what goes on in **S1**, and I will use it to systematise the relationship between oral texts, written texts, and maps. In this we can see a scholarly line from Schnitler's intellectual environment through Lessing to some of the central arguments in Elleström (2010).

Comparison between text and image was traditionally a comparison between the arts, and specifically between poetry and painting. The tradition is often called *Ut Pictura Poesis*, after the passage from Horace quoted below. I will focus on two groups of distinctions between painting and poetry discussed in *Laokoon*, which I refer to as *Bodies in space vs. actions in time* and *The*

[6](Sayer, 1989, 263) does comment on narratives underspecifying causality, but not on underspecification in textual descriptions.

question of coverage. Lessing clarified these distinctions in the form of aesthetic rules, and I will show that they are useful for understanding the relationship between texts and maps, before I show how Ellesström generalises them and offers a stricter system for comparison.

When I show that the conclusions from chapter 7 of this thesis are in line with distinctions made in *Laokoon*, I have also shown that the thinking was available in the culture in which Schnitler lived; it must have been, in order to be available for Lessing to formalise it in the 1760s. Lessing systematised ideas which were available in the culture in which he grew up, the same culture that Schnitler was part of. My argument is that these rules have a general impact on the relationship between maps and texts within that culture, and they were ideas known at Schnitler's time, so *Laokoon* can serve as a plausible theory for Schnitler's work. I have no direct evidence that Schnitler discussed them specifically, or theorised at all about such matters; the link is rather at the level of ideas common to European culture of the eighteenth century.

But the discussion started long before the enlightenment. In the written intellectual history of Western Europe, the relationships between the arts have been discussed since the early days of writing, even though the categories have shifted. The idea of the sister arts goes at least back to Simonides in the sixth century BCE. Simonides is also honoured as the inventor of the "art of memory" in which mental images are used to remember textual narratives.[7] The art of comparing poetry to painting is connected to a passage from Horace:

> ut pictura, poesis: erit, quae, si propius stes, te capiat magis, et quaedam, si longius abstes; haec amat obscurum, uolet haec sub luce uideri, iudicis argutum quae non formidat acumen; haec placuit semel, haec deciens repetita placebit.[8]

[7]More on the art of memory in Yates (1966); for Simonides' role in inventing the art of memory as well as the idea of the sister arts, see specifically 28. See also Mitchell (1980, 557). On the role of the art of memory in creating longer texts, see Lancashire (2010, 51–52).

[8]"As is painting, so is poetry: some pieces will strike you more if you stand near, and some, if you are at a greater distance: one loves the dark; another, which is not afraid of the critic's subtle judgment, chooses to be seen in the light; the one has pleased once, the other will give pleasure if ten times repeated." The latin text is taken from Horatius Flaccus (1971, 68), whereas the English translation is from Horatius Flaccus (1863, l. 361–365). In the interpretation, I lean heavily on Brink's comments in Horatius Flaccus (1971, 368–372).

The section explains certain things about poetry by comparing it to painting. The best pictures are the ones we would like to see at close range and in good light. This compares with poetry: The best poems are the ones we would like to give close attention under good reading or listening conditions. For both poetry and painting, good works stand up to repeated inspection, whereas those of lesser quality are seen once and then discarded.

This has been understood to mean something more and different, however. The idea of similarity of the sister arts was based on a long tradition of misreading these sentences from *Ars Poetica*. In the eighteenth century, the phrase *Ut pictura poesis* was read as "a poem *will be* like a painting" (Marshall and Mace, 1997, 683, italics in original). The *Ut pictura poesis* dogma was combined with an assumed superiority of the visual arts at the time when Lessing entered the scene. It did not always lead to the view that painting is necessarily better than poetry, but as poetry was seen as images painted with words, it put pressure upon poetry to be like painting. In the enlightenment, this dogma was put to an end. Lessing wrote the most important text for this demise.

Gotthold Ephraim Lessing was born in 1729 and died in 1781. He was an active participant in the development of German literature in the enlightenment era, as a dramatist as well as an art critic and philosopher. Lessing saw the language of poetry misused by people who believed that what was beautiful in a painting would be wonderful as a poem. Based on this observation, he took it upon himself to describe how poetry should be written—which techniques were suitable to the medium, as opposed to painting. He published the most important part of this discussion in *Laokoon* (Lessing, 1893).[9] The main importance of his work lies in clarifying and systematising ideas about the difference between painting and poetry that were already expressed separately in the works of other authors.

For Lessing, a totality exists which can be called "The Arts". The forms of art are variants of this totality. Among the forms are painting and poetry, and he is trying to find the borders between these different forms. Each of them

[9] *Laokoon* was first published in 1766. Lessing also discussed similar ideas in *Hamburgische Dramaturgie* (1767–69), in notes for the second and third parts of *Laokoon* that were never finished, and in letters. I use the published *Laokoon* in this discussion.

has its special characteristics, and he claims that each of the art forms must be true to these characteristics (Bale, 2009, 141).

Lessing discusses the viewing of paintings and reading of poetry. His work has strong implications for the creation of poetry and painting as well, leading some critics to see *Laokoon* as a manual of poetics. When I talk about rules in regard to Lessing, this is based on the strongly prescriptive tone that runs through *Laokoon*. Although Schnitler could neither obey nor break rules that Lessing wrote after his death, the culture from which *Laokoon* arose was also the one in which Schnitler was educated: the first part of the eighteenth Century, seen from a German-speaking perspective.

Based on examples taken from different works of poetry and plastic arts, Lessing established several distinctions with variable clarity. I will discuss two major distinctions, or groups of distinctions, which I will refer to as *Bodies in space vs. actions in time* and *The question of coverage*.

According to Lessing, the real object for painting is bodies in space, and the real object for poetry is acts in time. Painting uses figures and colours in space, while poetry articulates sound in time. The signs used need to have a comfortable relationship to the signified. Things beside one another are bodies. Things after other things are acts. Poets must make their characters act, and thus characterise themselves through acting (Lessing, 1893, ch. X, XVI).

The speed with which we are able to get an overview of an image is very different from the speed with which we get an overview of a text. The text has to be read and understood, while the image just has to be glanced at. Even a complex statue or painting can be seen at a superfluous level quickly, whereas a complex textual description has to be read before the main structure can be understood. When we look at a clear expression of things in space on a painting, we rapidly study the parts, then their connection, and then we combine them into a whole. When a poet tries to copy this process, it is not fast enough, because reading will take too much time. When reaching the end, we have forgotten the beginning (Lessing, 1893, ch. XVII).

This difference leaves room for different rules for how the two art forms should be used. In narration, an object should not be described so that a painter could follow the description. Rather, a story about how it is created

should be told. The reader will then see the making of the object as a process.

This is connected to how Lessing sees complexity handled by art. The way he sees art as reducing complexity can be compared to modelling as the concept was used in part II. The infinite, unmasterable complexity of reality interferes with the intelligibility of the painting or sculpture. In poetry, this complexity is reduced by abstraction; through the segmentation of the world which language has accomplished, essence has been isolated from accidental features, has been abstracted from the particularities of individual occasions. The perceived world has already been segmented and conceptualised for the poet by language, using discrete expression tokens (Wellbery, 1984, 154–155).[10]

This brings us over to the second area, namely the question of coverage. Clothes on a statue cover what is beneath. The plastic artist has to choose, whereas the poet can describe the body as well as the clothes covering it (Lessing, 1893, ch. V). In poetry, nothing stops the author from describing the naked body underneath the clothes of a dressed person, whereas in plastic arts, the clothes will cover the body.

So plastic arts do not aid imagination; even worse, they lead the imagination astray, placing the image in time and thus transforming it into temporal content, an unwritten narrative. In the plastic arts, selection determines content substance. In poetry, selection yields discrete content units (Wellbery, 1984, 169–172). What is abstract and only hinted in poetry has to become concrete in painting.[11] In the plastic arts, the signs are arranged spatially. The fact that clothes are actually covering something in the plastic arts is an example of the syntax of the plastic arts restricting its semantics.

> 'For the poet, a cloak is not a cloak.' For the sculptor it is; not entirely, but insofar as the expression token / cloak / is material

[10] In chapter 3 we saw how the wish to differentiate the essential traits from the accidental ones marks a similarity between the natural historical work of Linné and Schnitler's work. In line with the present discussion, the differentiation can also be connected to differences between media.

[11] An example of such undetermined units taken from modern media is the fact that in a novel, the skin colour of the characters may be undetermined. In a film version of such a book, actors will have to be chosen for the roles, taking their skin colour with them. This can be overcome by a creative film maker in various ways but the point here is that in a film it has to be overcome, in a novel it can just be omitted. This is in line with underspecification as it was defined in chapter 7 above.

> and occupies space. *The syntax of the plastic arts is the set of spatial relations between real things* (Wellbery, 1984, 127, italics in original).[12]

Based on Lessing's work in the area of comparison between poetry and painting, we have established two oppositions:

1. Actions in time should be applied in poetry, and bodies in space in painting.

2. What is hidden is not seen in painting, while things hidden can still be seen in poetry.

These are the two oppositions I refer to as Lessing's rules, and they will be used later to understand better the problems systematised in chapter 7. The arguments in *Laokoon* are based on the idea that limitation is necessary to follow the laws of aesthetics. Given the historical context, Lessing proposes a new approach to aesthetic form rather than a new set of norms, an approach in which nature replaces traditional rules as the main principle. This is also a relevant conflict for Schnitler's work. His education was scholastic, whereas his work was based on people's actual understanding of the landscape as much as it was based on traditional rules.

But why call these two oppositions 'rules'? What kind of rules are they? Lessing's rules are prescriptive, not descriptive. They do not describe what can and cannot be done in poetry and painting, but rather how poetry and painting should and should not be made in order to fulfil their artistic potential. Still, Lessing's rules are connected to actual limitations in the different art forms, giving them an added descriptiveness. Lessing did state his argument in rather big letters, but I will still argue that the limitations he described are indeed there; that they can be overcome only confirms their existence. As we saw in the film example above, the text had no limitations in the specific area addressed, and thus nothing to overcome.

[12]What is here called 'syntax' was called 'syntactics' by MacEachren (2004) in his discussion of maps.

How exactly the limitations can be overcome has been shown by Frank (1963) in his discussion of spatial form in literature. While Lessing saw poetry and painting muddled together, the one influenced by the other, where each of them should follow its own separate way, Frank described how modernism blends them, using time for space and space for time, with plastic art losing spatial depth and poetry losing historical depth. While Lessing claimed that the border should not be crossed, Frank saw value in such border crossings; neither of them denied that the border can be crossed.

Lessing's laws are not natural laws; they are rather to be seen as social rules. They can be broken. Such breaches may cost you, but you may also gain from breaking them. The balance between loss and gain is dependent on many things, including the society in which you live and act.

Indeed, the border between space and time is always crossed in reading. When we look at a text, we see space. In order to turn that space into something to understand, we divide the space into lines of characters, and the characters are separately or, more commonly, in groups forming one or several words, read one chunk at a time. The process of reading happens in time, chunk by chunk, in a more or less linear fashion; at least, the ideal is linear.[13] Then, based on the understanding in our mind developed through this reading, a second kind of space may be formed, where we can "see" things like a table or a mountain, or even a page full of words described in the text.

The space we comprehend when we read a text is indeed reconstructed. But it is reconstructed through a very different route from the one followed when we see a figurative painting or a photograph of a table, a mountain or a page inscribed with words. The table we see in the image has a colour and a style. The table we read about does not need to have either.

Lessing knew very well that spatial and temporal features can be mixed, in poetry as well as in plastic arts. This is the whole point! They *can* be mixed but they *should* not, because of Lessing's insistence that the basic level of reading or viewing should be connected to the form of the artwork. The argument is based on his fundamental poetics, but he also clarifies, as it were,

[13]Lancashire reminds us that from the perspective of the text-creator, language is a succession of chunks, even if it feels like a stream (Lancashire, 2010, 49–50).

how the two art forms actually work. Plastic art is of course enjoyed in time. But the time in which we enjoy it is not connected to one specific route through the space of the artwork, as is the case when we read a text.

There is another important relationship at stake here which goes to the core of my project. How do we express our experience of one artwork in the language of another art form? Specifically, how do we move from image to text? Ekphrasis refers to verbal textual descriptions of visual works of art. Scholz (2007) aims at a more precise encircling of the concept. Of special interest to us is a shift of focus he connects to Spitzer's 1955 article on Keats's *Ode on a Grecian Urn*. Scholz argues that Spitzer shifts the focus of ekphrasis from the textual properties of the descriptions to the relations between described work and the description itself.

> It spells out explicitly that the *transposition d'art* of ekphrasis involves a gaze, a conscious encounter of a perceiving subject ('seeing', 'choosing', 'showing') with a work of art. The ekphrastic text thus comes to us, its readers, as the record of that gaze (Scholz, 2007, 290, italics in original).

The opposition on which the genre of ekphrasis rests is not the one between verbal and non-verbal, "but that of 'being verbally accessible' vs. 'being sensuously accessible' " (Scholz, 2007, 301). The same opposition prompted Lessing to claim that a description of a work of art should, like a description of nature, describe the real artefact (*wirklicher Gegenstand*), and not the thing seen as a sign.

In an ekphrastic description, as in any event in which an object of art, or a map, or even a natural object is viewed, the infinite number of possible routes through the visual space is collapsed into one. Thus, when a text is written as a description, a route through the described object is chosen, and all other routes are unchosen. The map as a document, with its potential for an indefinite number of different reading orders, thus gains all possible views of a certain kind by the radical sacrifice of the richness of any one view, whereas the text gains the richness of a particular view at a particular time by the radical

sacrifice of all other possible views.[14]

What exactly is the relationship between time and space?[15] We saw in chapter 2 how Gibson (1986) claimed that they are fundamentally different. We will later see that Elleström agrees. However, this is highly disputed. One of the most influential claims for their unity in narrative texts is found in Bakhtin's concept of "chronotope". In part II above we saw that the event in CIDOC-CRM is defined as people and ideas meeting in space-time. Bakhtin goes further, claiming that time and space are two different aspects of a larger, common whole.

Bakhtin defines the concept of a chronotope as "the intrinsic connectedness of temporal and spatial relationships that are artistically expressed in literature" (Bakhtin, 1981b, 84).[16] In this concept, time and space are inseparable; time is seen as the fourth dimension in addition to the spatial three.

We saw above how a written text is not only time-bound, but also spatial, at the basic level of reading. An oral text, on the other hand, is not spatial at this level. The connection between time and textual expressions, and the one between space and the plastic arts, are not simple dichotomies. The time-span difference penetrates every utterance that can be expressed orally as well as in writing. When a mathematical calculation is uttered, "$2 + 2 = 4$" is organised in time, but written down, it is rather organised spatially (Linell, 2009, 284). To move to a more abstract level, authors have always expressed themselves about space as well as time, and at this level oral text is equally as spatial as written text.

It is extremely important to keep these two levels distinct, while also seeing the relationships between them. In order to understand Lessing, we must distinguish between how language works at a basic level, the level in which

[14]This opposition can be seen as an analogue to the opposition between the scientific and the poetic trajectory, as it is discussed in the context of social science texts about geography by Sayer (1989).

[15]It goes without saying that this question will not be covered in any depth in this thesis. Only a few points will be made, based on the specific texts discussed here.

[16]I read an English translation of this text, so the original Russian citations are not included. The original article was published in 1975, but written in 1937–1938. Further, a set of concluding remarks Bakhtin wrote in 1973 were also included in the English translation I use.

the reading follows one route through the space of the text, and the level of understanding, at which all sorts of metaphorical spaces are created, in texts and images alike.[17] As we will see shortly, one of Elleström's main strengths is that his system includes a way to clarify this distinction.

The text is localised in space, whereas our creation of it when we read it happens through time. The text is never dead, but it is imprisoned in dead material, such as books. The textual work is categorically divided from the represented world; the author is always outside the world he represents, outside the time and space of the events, moving freely in time and space (Bakhtin, 1981b, 254–257). This is important to remember not least for nonfiction with autobiographical tendencies such as **S1**, because the author is never the same as the person referred to by 'Peter Schnitler' in the text; they are categorically different creatures.

Bakhtin claims that space and time are interrelated. And to a certain degree they are, in text. Yet, texts describe the time and space of the real world we all live in; or rather, based on the principle of minimal departure discussed in chapter 7 above, we will encompass the world we know as the place for narratives. So we should consider whether it is actually correct to see time as the fourth dimension of space in the world as we perceive it when we move around in it, as well as in the worlds we meet as representations in texts and images.

Gibson claims that in the real world we move around in, it is not. In his ecological thinking, he argues that events should be seen as the primary realities and time as an abstraction from them. Events are perceived by humans and other animals, but time is not. His thoughts about space are along the same lines: objects do not *fill* space because there was no such thing as empty space to begin with. The environment is always already full of things; the space we call empty is defined by the objects around it, so it is full by their presence.

> Time is not another dimension of space, a fourth dimension, as modern physics assumes for reasons of mathematical convenience.

[17]Thus, I contest the denial of the essential temporal nature of literature put forward by Mitchell (1980, 544–545). In my opinion, he underplays the differences between the media at the basic level of perception.

> The reality underlying the dimension of time is the sequential order of events, and the reality underlying the dimensions of space is the adjacent order of objects or surface parts. Sequential order is not comparable to adjacent order, it is not even *analogous* to adjacent order. For the order of events cannot be permuted, whereas the order of parts can. You can reshuffle the parts but not the events, as you can arrange the furniture in a room but not the happenings that occur in it (Gibson, 1986, 101, italics in original).

This, for what it is worth, is in line with Lessing's rule 1. If what I claimed in chapter 2 is true—that is, if the people Schnitler interrogated saw the landscape in line with what is described by Gibson and Ingold—then Schnitler, with his feet on the same ground as Lessing, actually had corresponding influences from both sides: from the people he interviewed as well as from his intellectual background. If this is so, then it also follows that the chronotope, with its deep integration of time and space, is less than useful in this context.[18]

What Gibson says in the passage quoted above is that events happening in time are frozen. To that I would add: as is the route we have followed once a journey is over, and the static line we follow when we read through a text. He claims further that the objects in space are movable. I again would add: as the track of observing an image may be different each time we view it, or the travel route as we move through the landscape can be different from the one followed on our previous journey.

So it actually seems to be the case that our perception of an environment and our reading of a text or viewing of an image are quite in line. The witnesses perceived the environment as objects in the world. Then they expressed this to Schnitler during speech events in time, in the form of a linearised oral text. Finally, after considering all the facts, Schnitler created new spaces: those of maps. These were different from, but indirectly based on and with some geometrical similarity to, the spaces experienced by the witnesses.

We now have a starting point from which to study what the differences are

[18]This should be investigated deeper than this short discussion. The last word is clearly not said about the relationship between or indeed the existence of time and space, neither in media expressions nor beyond.

about in more detail. How does this discussion relate to the actual differences found in part II and organised in chapter 7? In order to find that out, we must break into each of the types of media expression. This is where the technical analysis made by Elleström comes in. He takes the media apart and dissects the differences between them. A study of his analysis will conclude this attempt to use interart and intermedia studies to understand the differences between texts and maps.

8.5 Media modalities

In the tradition of interart studies, the existence of certain art forms was taken as the starting point. In a recent paper, Elleström (2010) takes a different approach. Instead of starting from a set of different media or art forms, he takes a bottom-up approach, starting from a set of media modalities of which each expression consists. His set includes four modalities: material, sensorial, spatiotemporal, and semiotic. The differences between texts and maps fall mainly in the latter two categories, whereas the main differences between oral and written texts are found in the former two modalities. In the following, I will show why.

A medium is a subcategory of all human forms of expression, as a form of art is a subdivision of the general category of the arts, ontologically speaking. The different media or art forms, whatever they are named and however they are defined, are ways to group entire expressions. Once a classification system is chosen, one can clarify how mixed a specific work is, and which media are the most important ones for this specific work.[19]

Elleström's modalities work bottom up. Any expression will include all four modalities, each in a form specific for the expression, but classifiable according to general rules. An expression cannot be divided into its modalities, as the distinctions between them are based on our analysis alone.

Elleström defines mode as "a way to be or to do things" (Elleström, 2010, 14), which is in line with OED (2012b, sense I.4.a). He stresses the need to

[19] All media are mixed media, that is, no medium is unintermedial (Arvidson et al., 2007, 13–14).

be clear about modes, and about how they are distinct from media, defining a media-based approach as different from his own, and based on an epistemologically difficult concept. He does not state this, but the media-based approach is clearly a top-down approach, which is also problematic because it treats the media forms as separate entities. The lack of distinction between the materiality and the perception of media, the distinction between documents and the reading of documents, is a second problem.[20] Although the modalities cannot be separated in practice, Elleström sees it as crucial to discriminate between them theoretically. "Every medium has the capacity of mediating only certain aspects of the total reality" (Elleström, 2010, 24).[21] Which aspects apply is based on the specific form of the modalities in each work.

In order to specify a medium, a type of mix between modalities representative for this specific medium has to be found. This could point towards a possible definition of media based on modalities, but this is not done by Elleström and will not be expanded upon here.

8.5.1 Material modality

The material modality is the most basic of the four and is described thus: "The latent corporeal interface of the medium; where the senses meet the material impact" (Elleström, 2010, 36). This is not the physical substance of the medium, but rather the potential in need of something to be expressed, that which is capable of being manifested in it. This something may be an image on a piece of paper or a computer screen, or a sound produced by a larynx or a loudspeaker. The actual manifestation through which this potential is realised is called a technical medium. Elleström suggests that the material modality is connected to content, whereas the technical medium is connected to form (Elleström, 2010, 30). The dichotomy form/content is problematic, however, and will not be pursued further here.

[20] This is in line with Bakhtin's distinction we saw above between the live text and its imprisonment in dead material.

[21] We see already here how this is in line with the results from the experiments, where we saw that maps and texts can specify different aspects of the environment.

Elleström singles out three modes as the most important ones of this modality:

1. human bodies
2. other demarcated materiality
3. less clearly demarcated materiality[22]

Neither maps nor texts use mode 1. Mode 2 is used by maps and written texts alike. Texts are generally expressed in two dimensions on paper or other surfaces and on computer screens; if a third spatial dimension is present, it typically has no other meaning than making the actual letters visible, such as writing chiselled in stone. Maps, although usually in two dimensions, are sometimes made with a landscape contour, in what is called $2\frac{1}{2}$ dimensions.[23] Maps on computer screens are two-dimensional at the level of the material modality. The third dimension, which is presented by use of perspective on screen as well as on paper, belongs to another modality: the interpretation giving three dimensions is created as a virtual space in the spatiotemporal modality described below.

The third mode comprises things like sound waves and laser and light projections. Oral text uses this mode. Performance cartography in the form of performances made by human beings using drums and chanting uses all three modalities: the human bodies dancing, the drum skin as a two-dimensional object, or the whole drum as a three-dimensional object with inscriptions, and the sound of the human voice, the drum, and possibly other instruments.

8.5.2 Sensorial modality

In this modality the human brain and body system meets the extra-human material through our senses.[24] Elleström's description of this modality is "The

[22]Demarcated means that they have clear boundaries, as opposed to, e.g., sound waves. The distinction is not the same as the one between fiat and bone fide spatial objects in geographical ontologies. Sound waves are not spatial objects at all in the sense used in geographical ontologies.

[23]The concept of $2\frac{1}{2}$ dimensions was explained in footnote 10 on page 31.

[24]Elleström comments on some of the brain research going on in this area. A more thorough comparison with neuroscience and also with Ingold's views would be most interesting. I will

physical and mental acts of perceiving the interface of the medium through the sense faculties" (Elleström, 2010, 36). The five modes of the modality are the five senses: seeing, hearing, feeling, tasting and smelling. Seeing is the main mode for maps and written texts, whereas hearing is the mode for oral texts. In addition, a physical $2\frac{1}{2}$-dimensional map may be felt, as are Braille letters when read with the fingers.

Because sensorial stimulus and recollecting are so closely related, all modes may be triggered by any medium. A famous example is the madeleines in Proust's *A la recherche du temps perdu*, where taste triggers memories in the form of many different sense impressions. This is linked to how spatial form in literature works (Frank, 1963). One may think that textual descriptions in general will trigger more feel, taste, and smell memories than maps do. Maps tend to be read in a more "objective" way, but is this always the case? Maps in historical atlases may trigger strong feelings among people who took part in the events being mapped, and the process of creating map biographies by first nation people is known to trigger strong feelings of grief in some informants (Tobias, 2009, 311). But is this based on the map or the story? Probably more on the story, of which the map is a servant only. So yes, texts are "warmer" than maps for most people.

8.5.3 Spatiotemporal modality

This next modality is described by Elleström as "The structuring of the sensorial perception of the material interface into experiences and conceptions of space and time" (Elleström, 2010, 36). This process is of special interest to my work, with its close connections to space and time. Through and with the experience of the media expressions, concepts are formed. The modality also includes the translation process in which we establish a feeling of space and time from what our senses sense. We do not know in full detail how the process happens, but we know the result: we experience time and space.

The experience of time and space given by a media expression is similar to the experience we would have if we lived through the same situations as the

not go further into this here, but some remarks were made in chapter 2 above.

ones we are reading about. The experience is also similar to dreams, in sleep as well as daydreaming. How similar are they? The similarity can be felt as very strong. But evidence presented in chapter 2 suggests that a landscape is learned in an inferior way when seen or heard about than when travelled through. This will not be studied further here.

There are four dimensions of our spatiotemporal perception: width, height, depth and time. The first three define space. Time works fundamentally differently from space. They are not seen as integrated in line with Bakhtin's chronotope; the view here is more in line with Gibson's. The sequentiality of time can be represented as fixed, partially fixed or non-fixed. A two-dimensional computer-based map with a time slider which can be moved back and forth, changing the map to represent the situation at different points in time, would represent time with only partially fixed sequentiality, as opposed to the fixed sequentiality of movie theatre film and live music. Elleström also mentions a third type, non-fixed sequentiality, which exists in, for example, truly improvised music. This latter type seems to be irrelevant to my work.

The modes

The following modes are the most important ones for this modality. The first tree concern space, while the latter three deal with time.

1. (a) space manifested in the material interface
   (b) cognitive space (always present)
   (c) virtual space
2. (a) time manifested in the material interface
   (b) perceptual time (always present)
   (c) virtual time

1(a) space manifested in the material interface The material interface of a map clearly manifests space. This is central to the way maps refer to the terrain, and is not dependent on the map's containing a set of correct references, or indeed on whether the referent (i.e., the terrain) even exists. It is equally

clear that oral text, being connected to a voice, does not manifest space. As for written texts, they do manifest space. Written texts are expressed in a two-dimensional space, but in most cases the spatiality of the text does not directly refer to the meaning of the text. The material interface is spatial in reading, but the perception incorporates temporality and sequentiality based on the conventional semiotic aspects of language.

The use of space for non-linguistic reference to meaning in written texts is most visible in poetry, but it can also be experienced in historical sources. One example of the use of a weak spatiality is Schmidt (1983), where he exploits the spatial order in which place names are listed in historical source documents to resolve possible identities of the places they refer to, based on the assumption that the order in the text to a certain degree reflects the order in the landscape.[25]

The spatiality of maps works differently from that in texts. A map symbol can be a single black dot whose location in the space of the map refers to the location of a boulder in the physical world. Another black dot can be up, down, or in any other direction from the first one. These two basic symbols have no order. Any of them can be read before any other. They have a spatial relationship without order.

However, when texts are put on a map, two different levels emerge. At the level of the internal structure of one textual expression, it is still linear. Even when put on a map, "New York" is not readable as "York New" or "eNw rkoY". At this low level there is a difference between meaning expressed on a map and meaning expressed in a text. Letters must always be put in the right order. If the order is broken, the letters become either another text or just illustrative objects, not letters of a language expression.

At the level of relationships between several textual expressions on the map, on the other hand, the governing spatial system is that of the map. At this level, two place names are located relative to each other based on similar rules as other map symbols; their spatial relationship is without order.

[25]More exceptions exist, also in other genres. It seems to me that the stronger the spatial reference function gets in such examples, the more map-like the text document gets. I will not examine this point any further in this thesis.

1(b) cognitive space Spatiality is more than the three physical dimensions. Our cognition works, to a large extent, in terms of spatiality. Abstract concepts and experiences of time also have spatial characteristics, and interpretations of narratives and music may also be conceived as spatial relations and patterns. So cognitive space is a fundamental aspect of all cognition, and is present for all three media types.

1(c) virtual space Oral texts have no space at all, only sounds in time, so in oral texts, all space is virtual. Although this virtuality is usually established based on the lexical meaning of the words, other forms are also available, especially when music is involved. Sounds can resonate with space, as in Sami joik, where mountain peaks can be expressed by aspects of the tonality of the joik, as we saw in part I above.

The decoding of a written text usually does not extract spatially referential meaning from the spatial organisation of the text when it is read as a linear string of character and/or words, taking the exceptions mentioned above into consideration. But there is still a space to be found. Through interpretation of abstract concepts in the text, a virtual space is formed in the mind of the reader.

The fundamental two-dimensional space shown on a map is not virtual, but there are also some tendencies towards virtual space in maps. For example, this is true for heights, which are often expressed in the form of colour shades or contour lines. The process of creating a virtual space through viewing a map is different from the process of reading texts, as it is based on reading another space, or rather another surface—the map.

2(a) time manifested in the material interface The corporeal interfaces of maps and written texts are non-temporal, whereas for oral texts they are temporal. Only when we read a written text does it become linear, as the order of the text as a string of characters and words is connected to grasping the meaning of the text. The intention of meaning creation through linear reading is there in the text, and the intention is fulfilled through an act of reading. We can study the beauty of calligraphy without even knowing where

the lines go, but in order to read the text built up by the letters, we need to find the lines. For maps, the order is more or less arbitrary; it will change from reader to reader, and from reading to reading.

Time is not manifested in the material interface of written texts; the temporality is secondary, which may be the reason for the ease with which maps integrate their texts. No comparable ease of integration between maps and spoken texts exists; they are still, after centuries of coexistence, felt as a mixed system.

2(b) perceptual time All media are realised in time. Even media that are not basically temporal become situated in time once they catch our attention. Even if there is no fixed temporal direction on a map, each map reading happens in time. So perceptual time is a fundamental aspect of all cognition, and is present for all three media types.

2(c) virtual time In static maps, all time is virtual. Interpretations of moving objects, which are seen thus from iconic grounds, always include the idea of states before and after the frozen time of the image.[26] In some types of maps (e.g., military history maps showing troop movements), virtual time is active.

A normal reading of a map will include an interpretation that the map is stating the situation at a specific time. This time is clearly expressed on some maps, such as statistical maps and maps in historical atlases. Some maps go far in the direction of expressing a timeless truth in their rhetoric, such as many topographical world maps. The knowledgeable reader will know, however, that the landscape is not stable—at least not on a geological time-scale—and that the projection distorts size, directions, or both.

In a verbal narrative, time is connected to narrative time. The words are spoken in an order. But there will be secondary times as well, functioning as virtual time. The event order of a story may be different from the order in which it is told.[27]

[26]This is similar to Lessing's concept of the pregnant moment (*der fruchtbare Augenblick*).

[27]This is a difference which is well established in narratology, e.g., as 'story' vs. 'discourse' in Chatman (1978).

Tension

There are certain symmetries between the space-related modes, **1 a–c** above, and the time-related ones, **2 a–c**. For the (a) modes, the differences are quite clear between the media we discuss: maps and written texts have manifested space, and oral texts have manifested time. As for the (b) modes, they are always present, but they work in different ways in maps and texts. The (c) modes are potentially present for maps, oral texts, and written texts, but whether they are necessary differs. An oral text can express space only as virtual space.

Virtual space and time are necessary when the represented spatiotemporal state is different from the spatiotemporal state of the representing material modality. Tension is raised when a medium lacks certain qualities in the interface, but still invokes these qualities in its perception and interpretations.[28] Maps can create virtual time only through tension. For written texts without the manifested space connected referentially to the described world, I find it reasonable to see a lack of ability to express space, leading to tension in this case as well. So these texts too can create virtual space only through tension.

8.5.4 Semiotic modality

The last of the four modalities is the semiotic. At this level, the understanding of the medium based on the meaning of the signs used in it is considered, or, in Elleström's description, "The creation of meaning in the spatiotemporally conceived medium by way of different sorts of thinking and sign interpretation" (Elleström, 2010, 36). Following Peirce, he groups the signs into three categories:

1. convention (symbolic signs)
2. resemblance (iconic signs)
3. contiguity (indexical signs)

[28]Tension is related to Lessing's rules, but raising tension is not the same as breaking his rules. The relationship is more complex; however, I will not work it out here.

As long as we discuss the basic sign system applied, and not the complex signs used in literature, such as symbols and metaphors, the two types of texts use only symbolic signs. As for maps, the semiotic system is outlined briefly in section 8.2.[29] Maps are images, and as such, they foster iconic sign functions, but not as many indexical ones as certain other images do. They are meaningful in a pictorial way and will induce pictorial representations in the mind of the reader. At the same time, the abundance of symbolic signs on the map induces in the reader a primarily symbolic kind of thinking as well. The mind conceives a map as both spatiotemporal and propositional structures simultaneously.[30] This, I assume, is what lies behind the comparison between a map and a library: the map is a space with a number of propositional statements spread out on it.

8.5.5 The model as a whole

The discussion of Elleström's model can be summarised as seen in table 8.1. When we study the plus and minus signs in the table, noting especially the places where the three media types differ, we see that the differences in the modality between media carried by sound and media carried by physical documents appear in the areas of the material and the sensorial modalities, whereas no differences between texts and maps are found there. This is in line with naïve observation: A document is a document, no matter whether it is a map or a text. Listening to talk is different from seeing a document.

In the area of the semiotic modality there are no differences between oral and written texts. We are now in the process of interpreting the meaning of what is conveyed to us. The differences between texts in different forms, such as a text seen as an image or heard as a sound, or even the contours felt in Braille reading, are not present at this level. Conversely, the flat physical surface of the document is no longer something making the text similar to the map. We are now in the process of understanding and using the information we see on the surface or hear in the air. Then we have to use our knowledge

[29]Both MacEachren (2004) and Brodersen (2005) base their studies of cartography on Peirce's semiotics. A deeper integration between Elleström's model and cartographic theory would be most wanted, but is beyond the scope of this thesis.

[30]This is well known from cartography. One example is Wood et al. (2010, 53–56), showing how the map creates a link between a place and a proposition.

Elleström			**Eide**		
Modality	*What the modality is*	*The most important modes of the modality*	*Map*	*Oral* text	*Written* text
Material modality	The latent corporeal interface of the medium; where the senses meet the material impact	1. human bodies	–	–	–
		2. other demarcated materiality	+	–	+
		3. not demarcated materiality	–	+	–
Sensorial modality	The physical and mental acts of perceiving the interface of the medium through the sense faculties	1. seeing	+	–	+
		2. hearing	–	+	–
		3. feeling	(+)	–	(+)
		4. tasting	–	–	–
		5. smelling	–	–	–
Spatio-temporal modality	The structuring of the sensorial perception of the material interface into experiences and conceptions of space and time	1(a) space manifested in the material interface	+	–	(+)
		1(b) cognitive space ...	+	+	+
		1(c) virtual space	(–)	+	+
		2(a) time manifested in the material interface	–	+	–
		2(b) perceptual time ...	+	+	+
		2(c) virtual time	(+)	(–)	(–)
Semiotic modality	The creation of meaning in the spatiotemporally conceived medium by way of different sorts of thinking and sign interpretation	1. convention (symbolic signs)	+	+	+
		2. resemblance (iconic signs)	+	–	–
		3. contiguity (indexical signs)	+	–	–

Table 8.1: Elleström's modalities (Elleström, 2010, 36), with my interpretation for maps and texts. Numbering in the third column of "Elleström's part" is added by me.

to decode the information carrier through interacting with it. The decoding is done differently for texts and maps because the semiotic systems are different.

The area of spatiotemporal modality is where the differences between maps, oral texts, and written texts are most complicated. The parentheses in the table indicate this. While it is true that maps and written texts both have space manifested in the material interface, and oral texts do not, space functions differently in meaning production. It is a similar situation in connection to time: it is not manifest either for maps or for written texts, but still, the two

media operate differently in time when we interact with them.

Maps and texts alike have space manifested in the material interface, but the way in which a cognitive space is established based on the material interface differs. Because the spatiality of texts is less directly connected to the spatiality of the described landscape, the landscape spatiality established in the mind of the reader is a reconstructed virtual space. As for maps, the space manifested in the material interface has a spatial similarity to the landscape depicted. Most modern readers will see this similarity; we are trained in map usage. But how about a culture without the reference systems of maps deeply embedded into its patterns of communication and reflection?

This study of interart and intermedia theory has shown two things. First, there are two rules established by Lessing which are in line with the thinking behind the stronger hypothesis from page 214. And second, Elleström's work shows that there are clear differences between texts and maps—not in the material and sensorial modalities, but rather in the spatiotemporal and semiotic. Lessing showed that poetry and painting can easily express some parts of reality, while each of them will struggle with expressing other parts. Elleström shows the same thing in a more abstract way, generalised over all media.

8.6 Texts and maps

This chapter will conclude with a theoretically informed comparison between texts and maps, leading to an evaluation of the stronger hypothesis. First, however, I wish to include a few words from some of the more knowledgeable amateur practitioners in map use: orienteerers.[31] The following quotation is taken from the introduction to a book about Tiomila, a 10-man relay race which includes both night and daytime legs:

> **Maps as memory archives**
>
> To orienteer, and to write, would be less than interesting if there were clear borders between open lines of sight and reduced visibility. I move forward through interpreting and understanding how

[31] Amateurs as orienteers, that is. Some of them also have a career in cartography.

> someone drew. Having written a text one has also drawn a map, which must be used in order for the printed book to be anything else than ink on paper. The reader does half of the work. Maps and texts exist only when used, when they are read.
>
> And what is printed can be read quietly on the couch. Yet one travels. And maps, as texts, can be memory archives, can help us imagine, prepare us for voyages, help us reaching the unexpected. The wonderful thing is that this can even happen when we totally misunderstood the book's or the map's signs![32]

Hearing and understanding the geographical aspects of a narrative include contemplating the spatial organisation of a landscape. This spatiality is expressed in words, in the linearised form of speaking and listening. Even if landscape understanding is partly individual, it is also something we can communicate about. Orienteering runners tell each other stories which are understood, and they share maps with a common, although not identical, understanding. What happens when we "read" a map that is different from reading or hearing a text? The characteristics of a map can be seen as constraints, but also as enablers. What is the trade-off when a narrative about movement through space is visualised? What is gained, and what is taken away? Conversely, what happens when we describe landscapes in a text?

There is a strong relationship between narrative and text. Lessing claimed that poetry should be used for events in time, not for descriptions of space, even if texts *can* be used for stories and descriptions alike. The amount of spatial detail one can reconstruct from a text seems to be limited, which is in line with Lessing's claim that describing an object in poetry takes too much time, so that the reader loses track of it. This may be one reason why textual

[32] "**Kartor som minnesarkiv** Att orientera och skriva vore ointressant om det fanns absoluta gränser mellan vad som är öppen fri sikt och vad som är sämre sikt. Det är i tolkningen, förståelsen och aningen om hur någon ritat, som jag når fram. Den som har skrivit en text har ritat en karta som måste brukas för att vara något annat än tryck på papper. Läsaren gör halva arbetet. Kartor och texter existerar först när de tas i anspråk, blir avlästa. Och det tryckta kan avläsas i stilla soffposition. Ändå färdas man. Och kartor kan som texter vara minnesarkiv, ge oss fantasi, förbereda oss på färd, hjälpa oss att nå fram också till något alldeles oväntat. Det underbara är att detta också kan ske när vi alldeles missuppfattat bokens eller kartans tecken!" (Hyttfors and Tirén, 2011, 5).

descriptions that are quite limited in what they actually convey nevertheless seem to be very detailed, as we saw in part II. Lessing's argument implies that a reader can cope with more detail in a story than in a description.

Detailed descriptions seem to be harder to understand than detailed stories. While a text, with its more abstract signification, is freer to convey underspecified information than a map, there is still a limit to this freedom if the reader is to comprehend what she reads, which may be too difficult if a landscape description is too complex. Then communication may break down; or rather, the only way really to grasp the spatial meaning may be to make a drawing based on it—a map. The text becomes a drawing instruction. But the drawing is only necessary if one really needs, or wants, to comprehend the detailed spatial description. This is often unnecessary in order to read and understand a text, as a description may serve numerous other purposes.[33]

While texts are freer, maps seem to be easier to understand. Scaled maps tend to be understandable to anyone with basic ability to read such graphical representation, an ability that seems to be either present or quickly developed by people of all cultures. Numerous examples of this can be found in Woodward and Lewis (1998), as well as in Landau and Lakusta (2009). It is easier for most people to understand space by studying Schnitler's maps than by reading his text. This seems to represent a general tendency of all maps and texts; however, it may be dependent on culture, and the abundance of maps in modern Western societies may have given us a bias.

Although maps are much quicker to take up than linear script, they are hard to analyse. Always ambiguous, the language of maps is never completely translatable. We may think we understand a map immediately, and in a sense we do, because it says such simple things which we are trained to know. But for historians, maps offer a slippery witness to the past, no less imprecise than written language (Harley and Woodward, 1987, 2–3). In my opinion, the difficulty of analysing maps is connected to the fact that the analysis takes place in verbal text. Texts cannot be translated to maps without loss of meaning,

[33]The landscape of Ishiguro's novel *The Unconsoled* (1995) is not comprehensible in any direct sense, as we saw above. The reader does not need to comprehend it either. Many more examples exist in fiction.

and it is likely that translating maps to texts is equally difficult.[34]

Still, even if hard to analyse, maps do give us easier access to a spatial overview, and this clarity comes at a price. Using a map, we give away some of the freedom textual communication offers us:

> we sacrifice the ability to deal explicitly with those principles of fuzziness, indeterminacy and evolving relations which seem inherent in all human action (Olsson, 1974, 53).

What is lost in indeterminacy is gained in oversight and clarity of expression. Maps can describe a landscape in great detail without losing the overview, as long as the map is large enough. In digital mapping, intended to be used on small computer screens, the lack of size is compensated for by zooming.[35]

Maps primarily describe. But even if they do not tell stories, they can be used for storytelling, connected to eye, finger, or pen movements over their surfaces. A trace of telling a story, or an instruction for retelling the story, can be put on the map document by lines, arrows, and small texts. But only a verbal message in the form of writing, speech, or song will turn the lines and arrows on the map into a narrative. Some discourses about space, such as route directions, have natural linearisations. In other cases, spatial structures have no natural linear arrangement. A common strategy in the latter case is to project an event structure onto the domain of discourse (Levelt, 1981), for instance by taking a mental tour through space—either a body tour or a gaze tour.

This points back to the art of memory and Simonides, and also to Lessing's rule number 1, which claims that poetry is for events in time and painting for objects in space. Reading a map comprises such a tour, removing all the non-followed routes through the space and retaining only the followed one. In situations of communication, maps are used quite differently from texts.

Silent reading is different from reading out loud. The difference may be minimal for text. If the listener does not make any comments, reading out

[34]This could be the topic of a study in line with the present, with the modelling method adjusted appropriately.

[35]Zooming, which is used extensively in digital maps, seems to have no parallel in texts.

loud is quite like a monologue. But when one is reading a map, the difference is fundamental. The moment someone starts reading, or talking over, the map, lines and trajectories start to appear, the sounds of the words mix with the image of the map, and the map turns into a background image for potential or past travels. When a story is told using a map, the process of telling—of going through the story—will create lines across, or through, the map. This line may be written, for instance with a pencil on a paper map or by a GPS system as a series of measure points defined to be interconnected by lines, or it may only exist in the moment of telling each part of the story as well as in the memories of the participants (Wood, 1993).[36]

As was shown for texts and images in general on page 229 above, reading a text is to *follow* an order, whereas reading a map is to *create* an order. One route through the described object is chosen, and all other routes are unchosen. Because reading a map includes the creation of a route through the map, reading it out loud to other people is a creative process in a different way from reading a text. In the latter case, the creative process lies mostly in *how* the words are spoken, not *which* words are spoken. Changing the order of the words will soon change the act of reading into something else. Reading a map in a social setting, on the other hand, is to define an order in which map symbols are called to other's attention.

The relationships between map symbols work differently from the relationships between words, clauses, and sentences during reading. These differences are linked to how we travel through a landscape. A journey through a real landscape can be represented by a continuous line. A travel narrative—that is, a text—cannot. The latter can, however, be represented as a series of place names. In a later mapping of the narrative, what was a route becomes a constructed line between the places on the map representing the places in the landscape denoted by each of the place names. This new line is created by the reader, rather than being a reconstruction of the original line. The original line was not expressed in the text. We know that there has to have been a line of travel, but we do not know from the text where it was. In the textual narrative

[36]This thinking is based on the distinction between *seeing* and *going* in Certeau (1984, 118–119).

the places are mentioned; the rest, the stages between them, may or may not be totally unspoken, but they are rarely fully specified. The text is silent about parts of the route.[37]

We are free to be silent about the connections between the place names in a text, whereas we cannot put anything on a map without locating it, without deciding on what is between it and other map symbols. We cannot be silent, because a blank area is a statement of blankness, and not a nothing. The semiotic system of a map endows a space on a map with a special relation to the spatial system in the world referred to. This is in line with Lessing's rule number 2, which refers to the differences in syntax and level of abstraction between poetry and painting.

The difference between points and lines goes to the core of cartography and has consequences for the semiotic status of maps. In a set of geographical vector data it is common that what was recorded when the data were collected was just a series of points, even for lines and polygons. If you look at, say, a road as it is presented on a modern digitally based map, what you see as a line is really a set of interpolations, usually straight lines drawn between measured points, even if the actual measurement points are rarely visible on the map. Such interpolations were common on maps produced through an analogue process as well. But in other cases we create curves based on air photographs or based on what we have seen when surveying the landscape. We draw curved lines which were not interpolations between points, but rather representations of what we saw. These lines are copied through several steps, keeping their indexical qualities, semiotically speaking, all the way to the map.

A digital raster map, which is a scan of an analogue paper map, is digital, but still, the bits are used to represent lines as lines. Thus, a sort of pseudo-indexicality is present.[38] When the map is vectorised, on the other hand, the

[37]Meister describes how underspecification is well known in narratology. The information is always selective and partial, it is "characterized not only by the material it explicitly includes, but even more importantly by patchy descriptions, schematizations, and omissions" (Meister, 2003, 18). The full truth about the character is never told; we must extrapolate based on world knowledge. The clever poet does not postulate the existence of the non-existent, he imitates an event, knowing that the recipient will complement it with images of agent and patient (Meister, 2003, 73). This points straight to Lessing's rule number 1.

[38]This type of indexicality is claimed for digital photographs, but the claim is not undisputed. See Lister (2007) for a discussion of the complexities of the indexicality when it is

curve is reduced to a set of measurement points, each recorded by storing numbers for the X and Y axes. The drawing of the map is then based on interpolation. The resulting map is better in many ways than the raster map, but the indexicality of the line is lost. No similar semiotic difference between lines and points exists in texts.

The differences outlined on the last few pages are fundamental. They steer what can be expressed in each of the two media. While they can to some degree be overcome, it is not necessary to do so in most situations of ordinary communication. Each medium can be seen as a tool, and when we build something, we use a combination of tools suited to the task. Combining maps and texts in practical work comprises an example of geocommunication, a mixed medium which may include maps, texts, gesture, and other dynamic elements. Performance cartography is a type of geocommunication.

Examples of geocommunication systems include car-mounted GPS systems, in which the two constituent media forms are a map and a computer-generated voice giving textual directions. Another example is the route-finding systems made available by many providers on the web, including Google maps, in which maps, textual directions and images are combined. A third example is a researcher with open books and atlases on her desk. Some of the contemporary users of Schnitler's material may very well have been in such a situation. His dataset could have been part of geocommunication systems already in his own time.

Historically, this concept is known considerably earlier. Purves makes a similar point about Anaximander's cartography and prose:[39] "it is possible ... to see the map and prose narrative as two mutually reciprocating halves of a single, complete 'text' " Purves (2010, 109). The fact that maps and texts are both needed for many communication purposes was also known in medieval times, at least in the fourteenth century (Schulz, 1978, 452).[40]

In combined map-text systems, the map is the static part, whereas the text is the active part establishing a movement in time through the static, timeless

seen in light of social practice.

[39]Anaximander (c. 610–c. 546 BCE) was a Pre-Socratic philosopher.

[40]A tracking of this idea though history would be a very interesting study.

space of the map. As a static map is frozen, it can be said to be outside time. The claim that maps are outside time may be true when it describes map use, but it is never essentially true. The information on a map is collected in time, that is, at different times (Jacob and Dahl, 2006, 325–327).

Whether or not a map is outside time is also a question of level. Some maps are produced to be used once, such as the physical copy given to an orienteering runner for a competition. After the competition the map, folded many times, damaged by water and dirt, may be used as a memorial object to retell the tale of the competition (Hyttfors and Tirén, 2011), but the map is never used again for navigation. This is, however, only one copy. Behind the copy there is a printer and all the other copies, used many times before, at the same time, and after the copy of our example. And behind that again we have the updating of the map, making a new print production a decade or two into the future, reflecting changes in the terrain as well as cultural changes in how the map presents the landscape. For the map is but one possible way of visualising the landscape, one in infinitely many potential ones; it, too, is underspecified.

But even if maps are selective and underspecified, they still connote truth. Furthermore, as political tools they also establish truth, as when a coloniser's map renames places. A map can lie by being denotatively wrong—for instance, by moving a border for political reasons. But even "correct" maps may lie. In such cases the map lies in the area of connotation, not denotation. Maps use space to denote space, but the space of maps is a manipulated and transformed world space, based on general and specific map schemata. People have to learn that maps lie (Monmonier, 1996), whereas text is known from the start to have a complex relationship to truth.

Maps and texts are different media which may work together in geocommunication. But even as separate expressions, there are links between them, created by place names.[41] They are used in almost all geographical texts and on most maps. They are the same in both cases: strings of characters to be read in the correct order, that is, short texts. The definition of 'place name' from page 77 is the same whether they are used on maps or in texts, yet the

[41]This fact is used in mapping of texts, as we saw above. Connections at the level of types, for instance when a river symbol is linked to the word 'river', are also used.

relationships to their contexts are different.

The main difference between the ways in which maps and texts use place names is related to internal context. In a text, either oral or written, place names are connected to words around them by syntactic rules. On a map, on the other hand, the rules are geometrical. In a text, the place names follow the same rules as the words around them; they are made from the same substance—from letters. On a map, the spatiality is broken by the introduction of a place name, because it is not connected as a spatial object to the landscape: it is not indexical. Instead, it works symbolically, as does the cross symbol for a church. One arm of the cross has no spatial meaning, unlike the meaning a section of a road symbol has. Neither has the 'L' in 'London'; it has meaning only as part of the word. The name as a whole is connected to a point or area on the map. Each letter in a text on the map is located in the space of the map, so reading can be seen as moving across space (Jacob and Dahl, 2006, 202–203). But it is not; not really. The letters are outside the spatial system of the map, so a claim that the 'o' in 'London' is east of the 'L' is seen as silly by a competent map user.

A proper noun provides a name for an instance of a general type when the instance is unique within an implicit context. This is the same for maps and texts, but when a toponym is added to a map, it is often connected to a symbol. The symbol is known from the legend or otherwise to represent a class. A symbol becomes particularised when it is located on the map; it becomes a representative of the class located at a specific place (Wood et al., 2010, 58). This particularisation is supported by the place name. It may also lead to a subdivision of space, for example by separating out a wide part of a river by naming it as a lake, or by adding different names to different parts of a river system (Jacob and Dahl, 2006, 203–204). How the names on a map are chosen is a political, cultural and juridical question with potentially strong implications (Helander, 2009), connected to place name use in other settings, and to the general power play in map making. Here, too, not only the current power but also the marginalised can use the map as a tool (Mathisen, 1991). Even in cases where names existing in oral use were excluded from official maps for a long time, the situation can be changed.

So maps and texts are different media, able to articulate different aspects of the world they refer to. They can be used together in geocommunication, and there are connections between places on a map and places in a text expressed by place names. What are the implications for the viability of the stronger hypothesis from page 214?

8.7 Is the stronger hypothesis supported?

As we saw in Elleström (2010), there are two main areas in which we find differences between texts and maps. First, we have the spatiotemporal modality, where time and space are manifested differently in the material interface. We also have a difference in virtual space and time. There is a tendency towards symmetry here: what is true for space for one is true for time for the other. This is in line with Lessing's insistence on time and space as key concepts, presented as his rule number 1 above.

Second, there is a difference in the semiotic modality, namely the usage of iconic and indexical signs in maps, in addition to the mainly symbolic signs we see in both texts and maps. This is also in line with Lessing's views, especially in the interpretation of the differences between what he called conventional and natural signs,[42] also seen in his rule number 2. Spatial indexicality is something most verbal texts lack, even in written form, while it is of utmost importance to maps. The interaction between spatial location and non-spatial attributes is specific for maps (MacEachren, 2004, 164–165). In chapter 2, the distinction between navigation and wayfinding was discussed. In the context of Lessing's rules, navigation is more like an image, in space, whereas wayfinding is more like poetry, in time.

According to Jacob and Dahl (2006, 23–24), the drawing of maps appears when verbal language reaches its limits. In such a situation mapping is not used to replace verbal text, but to address communication needs not met by it. This is parallel to the way in which a map user in a communication situation adds verbal text and gestures to the map, and it is in line with Elleström's

[42] *Willkührliches Zeichen* and *natürliches Zeichen*. I will not go into Lessing's semiotic system here, but see Wellbery (1984) and chapter 5 of Todorov (1982).

view: "Every medium has the capacity of mediating only certain aspects of the total reality" (Elleström, 2010, 24).

The strong hypothesis is supported by the theoretical considerations in this chapter. However, the claim that maps cannot be made based on any text without making choices is not really sustained. In order to strengthen that claim, a wide variety of evidence from texts and maps must supplement the theoretical discussion in this chapter. This would clearly be beyond the scope of this thesis, which will soon be ended. Only one closing chapter remains.

Chapter 9

Closing remarks

Two hypotheses have been tested in this project, one weaker and one stronger. The weaker was found to be supported, whereas the stronger, although it is clearly in line with the literature we looked into in chapter 8, must be investigated further.

Now is the time for putting these results into a larger context. In this last chapter I will do three things. First, I will look into the deeper reasons for being interested in the problems discussed in the thesis. Then I will return to the method of experimental modelling, and discuss its viability. Finally, I will suggest three important areas for further research.

9.1 Maps and texts revisited

What happens at the border between texts and maps? One key question which was hinted at in the very beginning of the thesis is why people use either texts, maps, or both of them when they communicate about wayfinding and navigation. This question is connected to how the word 'map' is used. I will return to the discussion in the context of map usage; that is, I will see the use of the word 'map' in light of the use of the objects we call maps. This will show clearly the importance of the word 'geocommunication', a key concept which can be understood in the light of one of Lessing's basic ideas, namely, the fundamental difference between painting and poetry. I will argue for a similar fundamental difference between text and map, but also that the two

can be united in geocommunication.

9.1.1 Why did they not use maps?[1]

In the beginning of chapter 1, the goal of this project was presented: to gain a deeper understanding of how people reflect and communicate about geography. The problem has been addressed in this thesis by studying the relationship between texts and maps at different levels of detail. In chapter 2, we discussed how people find their way through the landscape. In this section I will ask a slightly different question, based on what was learned in the project: what reasons are there for not using maps to find the way?

Many of the reasons why people did not and do not use maps are rather straightforward. It may have been difficult to make map documents because of limited access to paper or other media. This became gradually simpler with the development of industrial paper production and printing. There is a significant difference between picking up a detailed map for a small sum at a petrol station, and having to draw or hand-copy the map. Further, oral communication may be better than maps in many ways: it can be used at a distance without exchange of physical things or even a clear sightline, and unclear points can be clarified by asking questions. Such choices are never made in a vacuum; habit is also important.

Descriptions and depictions alike omit much detail. Which details are omitted depend on the intended use, but not only that. The medium also influences what can be conveyed. Maps demand shape and size information that is not demanded by textual descriptions.

Easily accessible maps in modern societies have been mass-produced general-purpose tools up to now.[2] A map includes much more information than what is needed in most specific situations; a few verbal directions are often easier to relate to than a complex map, especially if one needs to memorise it. If one only needs a bit of topographic information, a verbal description can quickly

[1] Barbara Tversky provided valuable input to this section.

[2] The map seems to be changing from general purpose to personalised tools with the recent wide spread availability of digital mapping. However, the topographical data shown on the maps are still to a large extent created by large, professional organisations.

abstract and convey that information, which might be hard to extract from a map. In such cases, the abstract semiotic system of texts is more helpful than the many iconic and indexical signs found on a map.

Maps and texts alike also include significantly different categories, and some graphical forms which are not maps, such as topological maps, are also useful. Route maps may be more useful and easier to remember than topographical maps, but then again they are less general, and one would need many of them if one were to base navigation on them.[3]

Even if the statement in Wood et al. (2010) that there were no maps before 1500 is rather too bold to be entirely true,[4] there was still a remarkable growth in map production around that time. This was claimed by Wood et al. to be motivated by the needs of early modern states, and this is clearly one important reason. However, a need is not enough; the means must also be there, and someone with the means must have a desire to engage in large-scale map production. It is likely that the development was connected to changes in the production systems for documents, specifically through the introduction of widespread printing in Europe, as manuscript copying of maps is difficult. This would also explain why the growth in map production started somewhat earlier in China, where the printing tradition is older. Further developments in printing are also one of the reasons why maps could become so widespread in the twentieth century.

People's wayfinding methods are flexible, and usually, different types of wayfinding and wayfinding tools are used in combination. We gesture while discussing the best way to take. Gestures may be used in connection with a map, or with the landscape itself, or even without any of them, just pretending that they are present. Speech is often hard to disambiguate if gesture is not taken into consideration: "Let's go that way" means little without the accompanying gesture. People have extended their gestures with lines in sand, snow, or other surfaces, without necessarily seeing their practices as mapmaking; rather, the figures can be seen as parts of the storytelling, together with speaking and

[3]One can also use a general map to plan a specific route and then extract the specific information needed for the route and memorise it. This combines the generality of the map with the specificity of one planned travel.

[4]Wood et al. make many exceptions to the general statement themselves.

gesturing. Today many of us tend to see such activities as mapmaking, but this may very well represent an anachronistic view of the past.

Route sketch maps have been shown to be based on the same mental models as textual route descriptions (Tversky and Lee, 1999). It is important here to understand what a route map is: it is typically more similar to a topological map than to a topographical one. As we saw in the route description case in chapter 6, a topological map is a good way to express a network with only some spatial constraints; the same can be said of a route description.[5]

All in all, finding the way is a complex process in which maps may play a more or a less important role, if any at all. Parts of the process are accessible to consciousness, while others are not. In the self-conscious parts, maps, language, and communicative representations are available. Sensorimotor feedback from walking, running, turning, and driving is sometimes part of the conscious thinking as well, but often this is not the case; such feedback then operates at a different level from the conscious one. Other non-conscious elements may include wind, smell, complex visual information, and much more.

9.1.2 The push towards an inclusive 'map'

In part I of this thesis, the extended use of the word 'map' was discussed. Based on what we have learned in between, I will here try to answer the question of why the map metaphor is now so widespread. Is there a general push in modern Western cultures towards expanding the scope of the word denoting what we today call a 'map' in English?[6] If so, how can that be? There is a gap between actual wayfinding on the one hand, and representing landscape in language or on a map on the other. I claim that this gap is filled by linking the representation to the activity—that is, by extending the area of use for the

[5]The importance of networks also seems to be in line with the cell systems found in neuroscience, where cells representing locations in the environment form networks in the brain. I am not able to bridge the disciplinary gulf between wayfinding and networks as I found them in my experiments on the one hand and on the other how these topics are understood in neuroscience. Interdisciplinary work in, for instance, neurospatial-anthropology would be most wanted to investigate further into this, in line with what was suggested by Dobbs in Knierim (2007, 49).

[6]I do not claim this is different in other parts of the world, but these are the parts I know anything about.

word 'map'.

The discussion will focus on four categories of things: The landscape itself, our internal representations of it, tools used to find the way through it, and communication about it. 'Map' is often used for any of the latter three; one typical example is the way it is used in Harley et al. (1987). It seems to be tempting to use the same word for all three categories. This is not new; we have seen how the medieval word 'mappa mundi' denoted both physical maps and other things such as textual documents. Today's neuroscientists commonly use the word 'map' to denote systems in the brain.

If we compare the use of the word in Harley et al. (1987) to the definition on page 31, we see two different semantic fields which are partly overlapping. The latter denotation is a specific type of document. The former meaning is instead connected to processes of problem solving and may denote anything we use to find our way, including systems in the brain, texts, songs, and documents. Even a system helping us to find the way through an abstract system, such as a map of knowledge, is often included in this sense of the word. Further meanings, for example denoting a structure, are found if we consider the verbal form 'to map' as well.

In modern Western societies, we have a strange double view of maps which makes sense in light of the division between document and function. Many people love maps as beautiful objects. Just as exhibitions of manuscripts are popular among people not able to read their contents, so are exhibitions of maps popular among people independently of the reference functions of the maps. But after the first "wow!" when a beautiful map is seen, the reference function tends to come into focus. Then the impression of a beautiful sixteenth-century map develops into the view of a less than useful map which is full of errors. The map is still beautiful, but it also becomes a dated document signalling its historical era. What does such a map tell us about how the mapmaker conceived the world? This historically oriented understanding sees the map as a tool.

When we focus on the referentiality of maps, the focus on the documents in themselves loses ground. Then the work of the map[7] becomes the important

[7]According to Wood et al. (2010, 1), maps work in two ways: first they function as maps,

part. This is clearly linked to the tendency towards using the word 'map' not only to denote documents with spatial reference, but also to denote anything that helps us to understand a landscape and to find our way. We move from document to function. In this latter sense, the word 'map' is used for every tool we use, from documents via toponyms to systems in our brains.

In order to pursue my investigation, I needed to purge the concept of a map of all senses that go beyond those connected to physical documents. Only then could a comparison be meaningful. I will still argue for the need of a technical term 'map' to be used in research such as this, and I believe that neuroscientists working in animal and human wayfinding would be well served by taking up the suggestion of Nicolelis and Campbell (2011) to reconsider the use of the word 'map' in their description of what takes place in the brain. Still, it is clearly the case that people use the word 'map' to denote function as well as form, and in descriptive presentations of language use, this must be taken into consideration.

The importance of keeping a specific word for map documents lies in distinguishing them from texts, other tools, our thoughts, and the landscape itself. A map is not a silent geographical text, and geographical texts are not speaking maps. They are different parts of the hybrid information system available to humans for understanding and finding their way through their surroundings—of what I call a system for geocommunication.[8] Neither texts nor maps are necessary, and geocommunication systems may have other elements as well. 'Map' in the general meaning of the word, in the meaning of Harley et al. (1987) and of the function discussed above, denotes this system for geocommunication, in part or as a whole.

Even if the research reported in this thesis shows that there are things that cannot be said with a map, a map which can say and show everything still exists as an ideal. A divine intellect may see the world as a perfect map,

and second, they do active work to change the world, converting energy to work by linking things in space.

[8]Geocommunication systems is a vivid field of development in the Digital Humanities, see, e.g., Neatline, URL: http://neatline.org/ (checked 2012-07-21). Such tools can be used for deep mapping and represent attempts to break out of the restrictions of the map. This thesis may be used by some of their developers and users to understand better if and how this can be done.

including everything a text can express. Achilles's shield in Homer's *Iliad* is an example of such a 'map'. The antique Muses saw from nowhere—that is, from everywhere. This is similar to the perspective of the map. The Muses' perspective seems to be replaced by the modern map, but it is not, not really. An all-encompassing map is paradoxical: the viewer would be in it and on the outside at the same time.[9]

Maps have been and will continue to be important, but they can never become the all-encompassing system of the divine single glance. According to Purves, this was already understood by Herodotus: "Cartography may remain important as a visual system, but – for Herodotus, at least – it does not engage with the fundamental question of what happens when space, movement, and time intersect" (Purves, 2010, 158). Cartography must form an alliance with other media, including narrative form; maps must be used as parts of larger systems in order to tell full stories, if such stories can ever be told.

As the total map is not possible, we must choose between the precision and overview of a map and the ambiguity and underspecification of a text. Maps and texts relate differently to their contexts. A map is a continuous area, as opposed to the discrete tokens of a text. They can be combined, creating systems combining the strengths of texts and maps, as we see in geocommunication.

To a degree this is already inherent in the map medium, as all maps use texts. But maps rarely use narrative. The strengths of geocommunication systems go beyond the level of map documents because they also use narrative not bound by the spatiality of the map. Texts on maps play by the spatial rules of the map, whereas texts in geocommunication systems escape those rules.

9.1.3 *Ut mappa scribens*

The *Ut pictura poesis* tradition, and the end of it in the eighteenth century, can be used to understand better the relationship between maps and texts. The idea of the sister arts, the understanding of "poetry as speaking painting, painting as silent poetry", this idea that Lessing argued was wrong, was seen as true by many people because it was a reasonable view. It was usable, and

[9]These questions are discussed in great length in Purves (2010). They are also pinpointed in a fascinating way in Borges's story *Aleph* (Borges, 1970).

it permitted a good understanding of the relationship between the two art forms. The history of scholarly discussion since the enlightenment has shown that Lessing's view can be attacked from many angles; one example is Mitchell (1984).

The same goes for *ut mappa scribens*, the idea that a drawn map is like a written text. Indeed, expressions like "a geographical text will be like a map" or "a geographical text is a speaking map, a geographical map is a silent text"[10] are a bit awkward, but their meaning is quite clear and would presumably be accepted by many people.

But they should not be. As Lessing did for poetry and painting, we must go beyond the "sister media" of text and map in order to see how they are *truly* different. This is where Jacob and Dahl (2006) fail in the otherwise solid book *The Sovereign Map*. They see that a map is something more and better than a text, but the text is not respected as something more and better than a map. To them, the map can do everything a text can do, and usually better. The text is just a servant, or a poor cousin, of the map.

The problem with this view is that one of the two media becomes the norm for the other. What happens is exactly what Lessing warned against. What Brown says about Lessing's accomplishment must be said for the relationship between geographical narrative and maps as well: "each art is assigned an independent sphere in accord with its nature" (Brown, 1971, 87). The two arts are indeed sister arts, but at an abstract level, not in the way they use signs at the concrete level. Landau and Lakusta (2009, 17) understand this fully, as we saw above: maps and texts are truly different, and combining them produces in sum a very useful set of tools. They are independent in the sense that one should not mime the other, but they can still be combined in geocommunication.

In the early twentieth century, the idea of images as an economically efficient way of communication was established in advertising in the USA. Mieder has traced a small part of this history, the part connected to the slogan "A picture is worth a thousand words", which began with an advertisement for tram

[10]These are examples made up by me based on statements about the sister arts, as is the expression *ut mappa scribens*.

advertising in 1921, using the slogan "One Look Is Worth a Thousand Words" (Mieder, 1990, 209–210). It was claimed to be a quotation from a Japanese philosopher, and later it was attributed to traditional sayings from other East Asian countries, but Mieder found no evidence for this, arguing that the saying was created in 1921. It quickly caught on, however, and is now proverbial in many parts of the world.

A similar claim for efficiency can be seen for maps. In the area of geographical information, there is a general view that maps are better than texts for storing and communicating information about geography, and this is true in many cases. But in which cases? Are there cases in which the opposite is true? Lessing argued for the different qualities, the different areas where painting and poetry could work at their best. The image may have many good qualities, not least with modern capturing and dissemination techniques, but still, poetry is far from dead. I claim that the same is true for the sisterhood of geographical maps and geographical texts. The efficiency, clarity, and definitiveness of the map may appeal to our time, but the lack of specificity and the abstract openness we find in text are still important, in fiction and beyond.

This is in line with the claim in Sayer (1989): regional geography needs the narrative. But this is not just about using texts to express geographical knowledge. Such texts show no sign of disappearing. The real threat is rather in the way we use texts to express knowledge about landscapes, and the weight we assign to the accompanying map expressions we use in geocommunication systems. This is in line with the point made by Lessing about using one medium as the norm for the other. The danger is not a world with only maps and no texts; the danger is rather a world where texts become more and more like maps, less and less open, losing one of the main strengths of textual expressions about landscape. This danger has been seen for a long time, for example by Olsson (1974). It needs to be kept visible, not as a prohibition against maps but rather as a word of warning, in line with the warning issued in Monmonier (1996).

If I claim that texts are better than maps in some cases, what does that mean? Quality cannot be assessed without reference to what we try to convey, and what the limitations are to our means, intellectually as well as technically.

We have seen that texts can convey types of information that maps cannot express. I claim, on that basis, that knowledge can be expressed in a text that cannot be expressed on a map. But what does that imply? Can we not just change the way we say things so that we can express them in any of the media?

We cannot do that because the medium is not isolated from the message.[11] It is not just that we cannot say things in the same ways in texts and maps; we cannot even say the same things. If we take the message of Lessing seriously, which I think we should do at this specific point, maps should not be like texts and texts should not be like maps. This implies, for instance, what many people know well already: the navigation systems based on hybrid cartographic-textual interactive documents available on the Web and in the form of GPS based hand-held or car-mounted systems may be more useful than either a map or a text. One may say that the solution is hybrid. Or, at least, one solution is; GPS systems can be dangerous if trusted blindly.

But are not maps in themselves representatives of a fundamentally hybrid form, in that their graphical representations are connected to a set of texts written beside the image, a legend, the title, and so on, as well as within the image, in the form of place names? The form is hybrid in one sense, but the space of the map image is still governed by spatial rules. Even if texts on the map image help to particularise map symbols, they are not necessary, and the texts play the game according to the rules of the map.

In order to create a more hybrid form, the map would need some sort of temporal aspect. That comes with map *use*. Map use operates in time as well as space and possesses this higher level of hybridity. Maps in themselves do not. Many systems for digital maps, for example those used to implement deep maps,[12] possess that level of hybridity, but then they are geocommunication systems: they are not maps, but rather they include maps. In this sense, one can say that geocommunication is the result of adding time to the map.

[11]This idea was famously expressed by McLuhan in his 1964 article *The Medium Is the Message* (McLuhan, 2001, 7–23)

[12]Deep maps are used for topographical exploration beyond what can be done on maps as they are defined in this thesis. For a prototypical example of a deep map in the form of a book, see Heat Moon (1991). For digital examples, see footnote 8 on page 260 above.

9.2 Evaluation of my research method

The method used to obtain the results found in this project was experimental modelling. Was it a good method? Did it provide the results in an efficient way? Is it advisable to use similar methods in the future? These questions will not be fully answered in this section; rather, some views on the issues will be presented, based on my experience from this project.

I will not here discuss the institutional structures of digital humanities programmes, but only mention that the support of a study program with supervision was a necessary condition for the project, as was the funding, which was provided by The Research Council of Norway. It was also important to have access to an interdisciplinary environment for this research.

The topic of this section is instead the inner workings of the project. I studied a text closely; I was not doing distant reading of millions of pages. The computer was not used to store huge amounts of information, but rather to organise the information I had into entities and properties which could be reshuffled. These entities and properties were created in order to help me isolate what was in the text from what I brought to the reading process, and to test transformations. The use of modelling was an attempt to understand my own reading better, by entering computer-assisted layers of interpretation.

One reason for the applicability of the experimental modelling is that in the normal process of reading, the reader aims for understanding. I as a reader know the described landscape and I understand, or think I do, what the writer in the eighteenth century wished to convey, even when it is not actually written in the text. In order to see the invisible parts of this process of understanding, thorough rigor was necessary. The algorithm, with its unidirectional stupidity, was needed.

In the concrete process, the entities and properties were used to show whether or not the same information could be expressed in another medium—or rather, the cost of doing so. The modelling experiment showed results which were quite different from what I had expected. I thought the main results would be along the lines of impossible figures, with quite a lot of detail as to how and why these impossible figures did not match geometrical models in general and

maps specifically. Although some results were found in that direction, such as the problems with disjunction and negation, impossible figures were of little importance. The area of underspecification turned out to be more important. I find it hard to believe that I would have found that area without a digital humanities-based method.[13]

There are potential weaknesses in any method, including the one presented here. There may be things that cannot be modelled in the conceptual model. If such things could have been expressed as a map, the model might block new knowledge rather than support understanding. It might be standing in the way of new knowledge, because when using conceptual modelling, one can see only what can be seen in the conceptual model.

Such blindness was countered by using more than one method. The results found through modelling were reality-checked by manually comparing them to the text: everything that created problems in the modelling was investigated manually. If some of the results came into being because of the modelling method alone and were unrelated to any media differences between texts and maps, such results would be detected as false in this manual investigation. If the modelling unduly blocked something that could have been expressed as a map, this is likely to have been detected in the manual examination of the modelling problems. If not, future researchers will, one must hope, find out.

However, in order to evaluate the applicability of the method of experimental modelling, a study of the results is not enough. One must also look into the process of finding the results. Then the question of skills becomes a crucial one. Which skills are needed for research in line with this project?

9.2.1 Does the researcher have to be a programmer?

In this specific project, the researcher had to be a programmer. In addition to the interactivity one has as a user of a system, the interactivity of the developer was necessary. I needed an active engagement with the workings of GeoModelText in order to find my results. No modelling project that needs this added level of interactivity can be run by a traditional "lone scholar" if the

[13] Another thing is to find results which are more generally in line with my findings. That has clearly happened many times without computers; Lessing is but one example.

researcher is not a programmer. However, with a team of researchers rather than a single one, it may suffice if only some members of the group are able to develop software, as long as the programmers are full members of the research team rather than its servants.

The fact that I needed to be a programmer to be able to see this project to its end was the result of my need to make the tools I used, but not only that. I also needed to see the text in a specific way, which comes naturally when one is trained in algorithmic thinking and practice. The philosopher Jakob Meløe based much of his work on the study of fishermen and reindeer herders in Northern Norway. He showed how the world one sees is based on the skills with which one may meet it. The physical rocks, sand, and water making up a natural harbour are there for us all to see, but the natural harbour is not something I would "see". A fisherman with a boat too big to be dragged ashore, but small enough to need natural harbours, sees it as a harbour (Meløe, 1988, 392–394).[14]

I needed insights arising from my training and experience in developing computer systems. I too see things based on the skills I use when I act in my environment—an environment of computing machinery in my case.[15] The witnesses presented in **S1** saw the landscape as wayfinders and were able to describe it, which was an important part of the reasons why their knowledge was important to Schnitler. The landscape was a sort of wayfinding affordance to the witnesses. Schnitler saw them as knowledgeable humans and was able to learn from them. I saw the text as a programmer and was able to learn from how it works in a different way from what would have been possible if I had lacked that skill.

I believe the important lesson to learn is that we need researchers with a variety of skills in addition to their knowledge. Some researchers should be programmers. That allows us to think about certain special problems in our

[14]This is in line with Gibson's affordances: the harbour is an affordance for a skilled fisher, but not for me.

[15]The question of whether the researcher must be a programmer is not new; it was on the table at least as early as 1962, when Dearing made a similar point in a speech: "No greater device for ensuring logical thought has ever been developed than the modern electronic computer" (Dearing, 1969, 97).

specifically skilled ways, and the skills to use the computer to produce whatever outcome our theme and methodology lead to. Other researchers should be reindeer herders, giving them another type of additional skills and, through them, also knowledge.

9.2.2 Writing code?

Being a programmer is a good thing, in the sense of having a set of skills and experience leading to certain insights. But why use the skills in this specific project? Why did I develop software? After all, the aim of the project was basic research, and a written thesis is the main outcome of the project. Are not the training and skills as a programmer enough?

I did not program first and foremost to learn from it. Instead, I wrote code because I needed an application tailored to my needs. My work was different from what had been done previously, and I needed more control than any pre-existing tool could give me. GeoModelTool could be developed in *any* direction, not just any direction which happened to be written into a piece of pre-existing software. It is often fine to follow paths which already exist, but in this case I had to leave them in order to find interesting stuff in the terrain beyond.

However, programming has its dangers, which are first and foremost connected to time. It was important not to spend more resources on software development than what was absolutely necessary for the research. I am not claiming I did not make mistakes, and I did try out several paths which I later abandoned. The point I make here is rather connected to two specific practical issues. First, it was important to stop and reconsider on a regular basis. Is this really necessary? Could it be done in a simpler way? And second, it was necessary to avoid misplaced perfectionism.

The time it takes to develop an application which can be used by one person with full knowledge of its peculiarities is very different from creating an application that can be sold on the market or delivered as free software to the general user. In developing this kind of "personal software", no generalisations have to be made regarding the input, storage, and output formats. The software has not been tested on any hardware except for that used in the project. It

cannot be used in its current version to analyse any other text.

There is, however, a significant difference between tools and data. In GeoModelText, operations are implemented which would be hard to do in an XML-oriented system. All my data, including my models, can still be exported to XML. Everything I added to the text is expressible in an extended TEI document, and it is exported from the application to such a TEI document.[16] One reason for creating GeoModelText is that the processing is much simpler there, and it was extendable in many directions. However, once the experiments are done, the data created can be linearised as XML and made available for other types of use.

9.2.3 Does the reader have to be a software user?

The presentation of my results has been a difficult task, in other ways than what is typical for research projects in the humanities. The model as such is within GeoModelText, and even if output exists in the form of long lists, graphs, and maps, the tool is nevertheless created to be used interactively. It is only alive when GeoModelText is running. How can an understanding of this model be linearised as a text with just a few small illustrations no wider than 14 centimetres?

This problem is clearly linked to the media translation problems which are the main topic of the thesis. The difference between a text and an interactive model is yet another media border which is hard to cross, in line with the text/map distinction. A computer application can express only certain aspects of the total reality, and these aspects are not the same as the ones a text can express. The overlap is significant, but far from total.

A text is better than a computer interface for presenting a lengthy, consistent argument as well as for explaining how the work was done, whereas the model interface and visualisation tools are better at presenting the data, the models, and the maps. This means that the reader of this text can get to the

[16]TEI as a data format is constructed in a way which makes is easy to embed sequences coded in other formalisms than TEI. So even if some of the data are hard to express in the formal structures prescribed by TEI, they can still be included in the TEI document as snippets formalised according to other standards.

full argument, as a reader of a history of cartography can get to the full story of map production and use, with only a few illustrations. However, in order to really comprehend the map as a tool, full, large maps should be studied and also used for navigation. The case here is analogous. The argument is in the text with its small illustrations, and the reader needs to be a software user only in order to get to a different type of understanding.

For the reader/user/developer who can change the code of the software, yet another level is available. This is similar to being a cartographer who actively modifies and further develops maps. The understanding gained through such processes will necessarily be for the few. Not only the skills one needs will limit their numbers; in most cases it also takes too much time to go to such depths, even for the skilled ones.

9.2.4 The data package

The data package is submitted in the form of a set of webpages.[17] No data in this project are in need of protection against public access, and the data package includes material which is less than well organised or formulated. There are five main parts of the data package:

1. The source code for GeoModelText. This is actually a link to Sourceforge,[18] a free software project hosting service.

2. Documentation for GeoModelText. This includes low-level technical documentation which should be used in the context of the comments within the source code.

3. A runnable version of GeoModelText. It comes with all the data files automatically loaded from the web on start-up, but full functionality requires very specific structures in the local file system or adjustments of the source code.

4. An overview of the tools I have used to analyse further the output from GeoModelText.

[17] URL: http://www.oeide.no/dg/dp/ (checked 2012-08-27)
[18] Webpage: http://sourceforge.net/ (checked 2012-07-13)

5. The lab diary and other files from the process of experimental modelling are included in the raw form in which they were created.

The data package should make it possible to follow the historical development of the project. However, this thesis is a better source for understanding the results and the scholarly argument connected to them. The text of the thesis includes a level of interpretation which is mostly lacking from the data package.

In order to use the software in its current version unchanged, the user will need to study **S1**, using similar methods to the ones I used. The tool is linked to the task. As an analogy, the tool developed here cannot be compared to any mechanical tool you would buy in a hardware store. It is more like a tool made by a mechanic in his workshop in order to solve one specific problem, such as lubricating one part of a modified engine. Parts of the tool may be useful for something else later, but only after modification.

Such after-use may happen at two different levels. First, the methods developed, from the general concepts down to specific windows, can be used as an inspiration for other types of work. Second, the code itself, from the full application to smaller parts solving specific problems, can be used in other contexts. These potential uses are, however, not part of the main goal of the research, and they will only come as additions to the basic research outcome. I have made the code available for such re-use because I think it may be useful, and would be happy to assist potential users in such work afterwards. I would really like to see parts of my code finding its place within existing free software systems.

9.3 Further research

Three directions for further basic research are apparent on the basis of this thesis. First, the modelling process can be developed to a level where maps of possibilities can be exported for further analysis. This would potentially open up to a deeper understanding of the ways the spatial relationships expressed in texts play out in a graphical medium in which uncertainty can be handled

systematically. And second, the stronger hypothesis from chapter 8 is in need of further evidence in order to be evaluated better. Finally, the consequences of this research for the extrasignificant sign systems of maps—that is, for whole maps seen as cultural signs—should be developed. These three areas will be discussed briefly here.

9.3.1 Larger maps or "maps"

In chapter 6 it was shown how different choices in the reading of **S1** led to different maps. Then, in chapter 7, we saw how presenting fields of possible locations of the places described in the text could represent a truer expression of the reading of a geographical text than could any single choice of location and form of places.

The research suggested here would build on the method used in this project and develop it further. Applying such a method can be done at two different levels. First, if one is using a pre-existing map as a basis for representing the reading of the geographical text, then small sections of texts which are hard to identify can be modelled as rooms of possibilities. The second level is to base the geometric model on no pre-existing map, thus modelling the whole text this way. In the latter case, the result may be rather complex.

A prerequisite for such complex models would be a more advanced set of algorithms creating the spatial representation of the formalised model based on the reading of the text.[19] Such algorithms would create expressions of the geometrical circumstances in a mathematical language.

Visualisation will be a challenge for such a system. It is not necessarily difficult on a technical level to make visualisations, once the geometrical structures are formalised; it is rather a problem of making the visualisations understandable, especially for users who do not know the details of their creation. It is hard to find a graphical language in which to express topographical uncertainty; after all, most systems for uncertainty mapping are made for thematic rather than topographical uncertainty, and people's experience in and expectations of reading maps are based on this.

[19]Technically, it is the stage from RDF model to vector data in GML which must be developed further.

A system for developing rooms of possibilities should also have mechanisms for reducing uncertainty based on the cross-connection of places. When places have a number of relationships to other places, the uncertainty in the system as a whole may be lower than the uncertainty of the relationships taken separately, in line with the findings for time in Holmen and Ore (2010).

As far as I can see, such a system will have few uses beyond basic research. However, results found through experiments on the system may be used for further development of methods and tools for the mapping of historical textual information.

9.3.2 More evidence

In order to collect evidence for the stronger hypothesis which was presented in chapter 8, a wide variety of material should be studied. In this section, I will give two examples of concrete areas which can be studied, one from Europe and one from America. I will also draw attention to the references to the classical world made repeatedly throughout the thesis. That could also be developed into a set of evidence, based on research which is already available. Some small attempts can be found in Eide (2013).

The first example is Defoe's novel *Robinson Crusoe* from 1719 (Defoe, 2008). Underspecification is abundant in Defoe as well, as it is in **S1**. However, explicit ambiguity, negation, or impossible figures are not to be found. There is never only one map that can be drawn based on any of his descriptions, or based on the sum of all the descriptions in the book. But there are no situations which cannot be drawn as one map, once all the choices are made.

The fact that no examples of the problems related to ambiguity, negation, or impossible figures are found is likely to be connected to the nature of the text. It is fiction, so the author was free to present any kind of spatial structures he wanted to. At the same time, the text presented itself as a biography in the paratext, so there were good reasons to present the landscapes of the text as realistically as possible.

What we see in this novel seems to be in line with the stronger hypothesis from chapter 8; however, it must be investigated further in order to present

any conclusive answer.

The other example I will mention is taken from areas in what is now Mexico. It is largely based on Woodward and Lewis (1998, ch. 5), which presents a fascinating example of trying to overcome the space-time border. In the Aztec tradition, the difference between writing and mapmaking was played out differently from how it is done in most other parts of the world. This example shows how a different starting point will lead to a different way of creating documents, but also how the text-map problems still turn up.

In their so-called "painted documents" for wayfinding and property management, time was spatialised; the depiction of space was not separated from the rendering of time; the way through space was also a way through time. (Woodward and Lewis, 1998, 193). Specifically, footprints on the maps show time ordering the narrative. Lists of place names denote border places: they do not correspond to the location on the ground, but the order is correct. They function as spatially ordered lists. The size of hieroglyphic place names grows and shrinks based on their development in power when maps are redrawn. This implies that in addition to geography, the maps document political changes in the area. Maps were not meant to be used as geographic guides by someone not familiar with the areas; they were instead used to anchor stories and demonstrate political power.

General information was conveyed with a combination of hieroglyphs, images, and signs. "Writing and mapmaking therefore rested on the same graphic substrate, employing the same pictorial conventions" (Woodward and Lewis, 1998, 198). The example shows how the expression of time on a map is possible, but it has to be conventionalised according to a system. So must space. But while the relationship between map space and the landscape is based on a geometrical equivalence, the relationship between map space and time space is different. To see time as space requires a metaphorical step; according to Elleström's system, time in the maps is virtual.

> Although the competing claims that narrative progression and cartographic acuity would make on the telling of history might ultimately be irreconcilable, central Mexicans were nonetheless compelled to combine history and space. Their search for forms to ac-

> commodate their understanding of the world led to the continuum of maps that range from the Codex Xolotl to the Codex Boturini. (Woodward and Lewis, 1998, 220)

It is clear that the Aztecs faced problems similar to the ones discussed in this thesis when they tried to include time in their static map documents. However, the documents may have been used in geocommunication situations, and thus, the time expressed on the maps may have been linked to the time of telling stories over the maps.

The most important point I wish to make with the last example is that there is a need for studying a variety of writing systems from different times and places in order to find out if some of them may render the stronger hypothesis invalid. That seems not to be the case for this specific example, but other traditions may give different results.

9.3.3 The map as myth

Throughout this thesis, the relationship between map and text has been seen in line with the relationship between painting and poetry, with a focus on what is different. I think this is an important discussion, well worthy of not just one but several books. However, some distinctions have been minimised in the telling of this story.

One of them can be seen in the following puzzle: according to Lessing, and to this thesis, text is more abstract than the plastic arts, because the plastic arts have to present actual people and things, taking many properties with them, whereas texts have abstracted away many of the accidental features, such as the skin colour or the clothes of a person. But in the discussion of the relationship between texts and maps, for example in Jacob and Dahl (2006), a text is seen as a more concrete expression situated in time and place, whereas the map tends to locate itself in a more abstract timeless truth. How can these two claims both be true if we accept that the map is a type of image, adhering to the rules of the game presented by Lessing? How can a text be both more and less abstract than a map?

The former opposition is based on how the intrasignificant sign system of

maps works. It is concerned with the relationships between map symbols, between the symbols and the depicted landscape, and between symbols and concepts. Seen intrasignificantly, the map symbols are more concrete than textual expressions. The latter opposition, on the other hand, is rather in the area of extrasignification. It discusses each map as one object, one cultural sign working in a society, with the tendencies towards myth pointed out by Wood and Fels (1986). In the extrasignificant respect, the map is more abstract, its binding to place and time is less concrete than the one we find in geographical texts. In this thesis, the focus has been on the intrasignification of maps. It would be most valuable to work out the implications for extrasignification as well.

9.4 Final words

I write software partly based on subconscious thinking. I feel, think, and code. Still, the code in itself is stringent and can be parsed. If it happens not to be, a computer will tell me so.[20] I perform experiments and write scholarly texts in a similar way. I feel, think, and write. I do not do so in clearly demarcated steps, but rather I do it in a movement back and forth. Still, when I do experiments they come out stringent and reproducible. The computer, as well as my own control, steers the process. The same is true of my writing: it is creative, yet controlled by a combined human-computer control regime. I let the computer assist my proofreading, but never steer it.

I do not really understand these processes. Neither do I fully understand how I, or any others, find the way. I use many different tools for wayfinding. I let my computer-based GPS system assist my navigation, but I never let it steer it. If I do, it will lead to problems. Tools must be used consciously, controlled by other perspectives.

In all our different scholarly disciplines we pick out small parts of reality. We find pieces of evidence, in the brain of the rat, in discussions with the

[20]For the programming in this project, it will be either a compiler or a runtime system giving error messages, or the application giving absurd results. However, in some cases errors do not show themselves and may go undetected. Such cases are dangerous.

Innuainut, and in the depth of eighteenth-century texts. But we cannot fully explain wayfinding in the texts we write, because wayfinding has one thing in common with computer applications, writing, brains, maps, feelings and wisdom: it does not exist in the form of a text and cannot be translated into a text without significant loss of meaning, and also, even if this is not really studied in this project, without significant loss of emotion.

Being a researcher is to play a role. This thesis is the outcome of my playing that role. The role is skill-based. It is, all in all, not too different from wayfinding; however, in the parts of research where we follow strict rules, as in part II of this thesis, it may be more like navigation.

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